The Magazine for ENERGY EFFICIENCY and WATER CONSERVATION in Industrial Cooling Systems

CHILLER & COOLING BEST PRACTICES

coolingbestpractices.com

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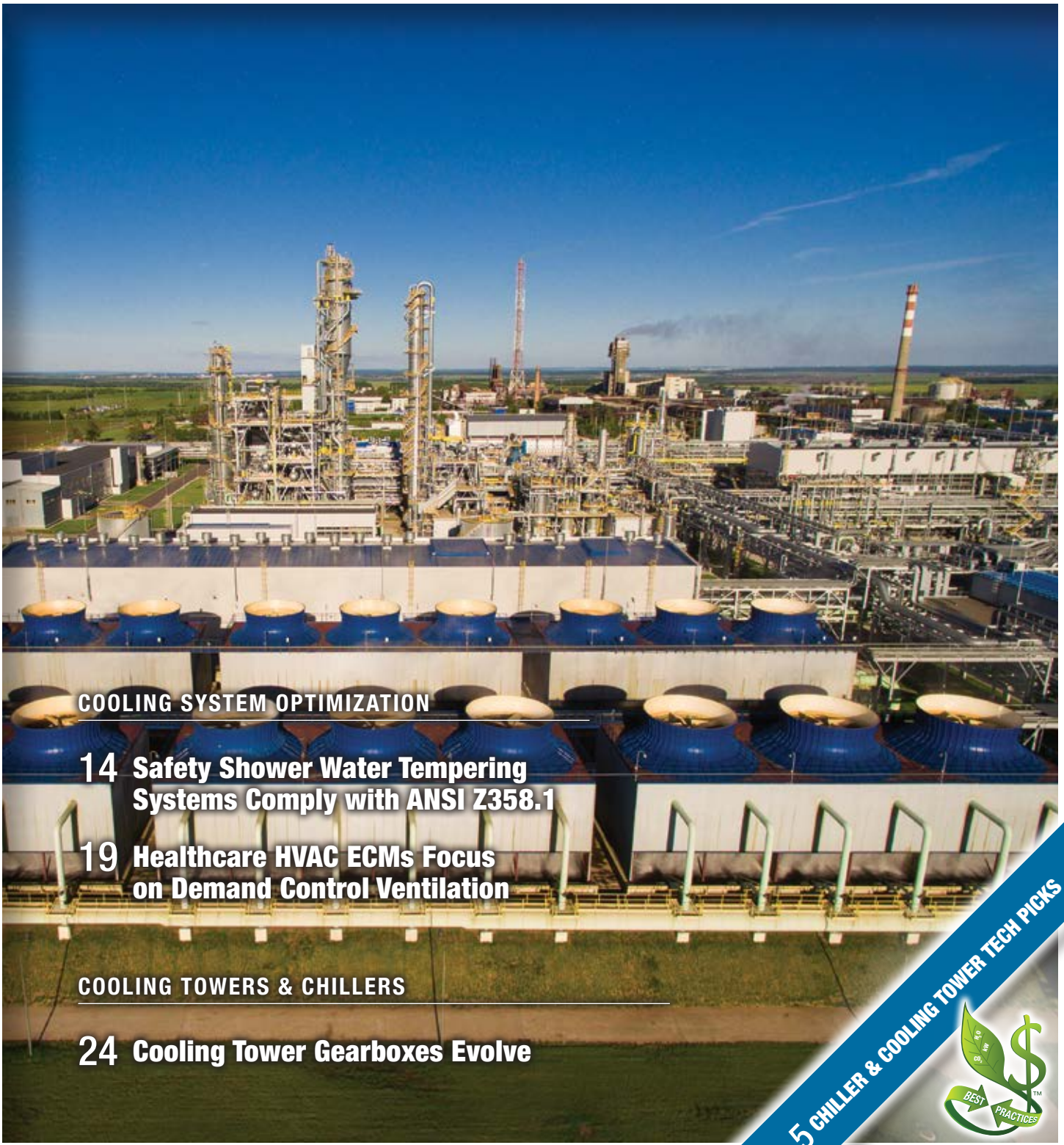

COOLING SYSTEM OPTIMIZATION

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FROM THE EDITOR

The American National Standard for Emergency Eyewash and Shower Equipment (ANSI Z358.1) provides guidance to cooling system design engineers and owners of chemical, petrochemical, metal fabrication and laboratories where these systems are needed in case of an emergency. We had the opportunity to interview Paul Heston and Tom Strock, from Hydrothift, about their deep understanding of the Standard and how they assist engineering firms in their efforts to design optimized systems. Of particular interest is their use of storage tanks to greatly reduce the size of the chillers in the system.

HVAC systems, in hospitals and laboratories, can consume up to sixty percent (60%) of the total building energy consumption. Rob Boyajieff, from Aircuity, has written an interesting article summarizing the Energy Conservation Measures (ECMs) they identify when doing system assessments. Improving airside efficiency, with demand control ventilation, is highlighted as the ECM with the largest potential impact.

Cooling tower gearboxes are used as speed reducers to slow the rotational speed from the incoming motor to the outgoing fan of a cooling tower. Jerome Jennings, from SPX Cooling Technologies, writes, "Companies operating high-capacity production plants, such as those in the chemical process and power industries, require cooling towers with large amounts of heat rejection capacity." His article outlines five (5) common gearbox issues and solutions encountered by cooling tower operators and maintenance engineers.

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

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RESOURCES FOR ENERGY ENGINEERS

CHILLER & COOLING TOWER TECHNOLOGY PICKS

BAC Launches new FXV3 Modular Closed Circuit Cooling Tower

Baltimore Aircoil Company (BAC) is providing new solutions for industrial cooling needs. The FXV3 Closed Circuit tower boasts an innovative set of features, giving new meaning to reliability and efficiency. Now the highest capacity modular closed circuit cooling tower on the market, the FXV3 surpasses historical standards.

The new FXV3 Modular Closed Circuit Cooling Tower

The FXV3 brings unmatched reliability with:

- ENDURADRIVE™ Fan System – The only variable speed direct drive solution for modular cooling towers that virtually eliminates maintenance and downtime.
- Up to 20% higher capacity in the same single cell footprint than other similar industry products. Certified Cooling Technology Institute (CTI) tested.
- Upgraded seismic and wind load capabilities to meet IBC code requirements.

Baltimore Aircoil Company is the world leader in the design and manufacture of evaporative cooling and heat transfer equipment. Founded in 1938, Baltimore Aircoil Company offers the broadest range of evaporative heat transfer products in the industry. Products and services include open cooling towers, closed circuit cooling towers, evaporative condensers, and ice thermal storage equipment. Headquartered in Jessup, MD, Baltimore Aircoil Company has manufacturing capabilities worldwide.

For more information about Baltimore Aircoil Company, visit www.BaltimoreAircoil.com, tel: 410.799.6200, email: info@BaltimoreAircoil.com

Danfoss Inaugurates First Customer Application Test Chamber

Danfoss, a leading manufacturer of high-efficiency electronic and mechanical components, controls, compressors, and variable frequency drives for air-conditioning, heating, refrigeration, industrial, and water systems, opened the first test chamber of its new Engineering Tomorrow Application Development Center in Tallahassee, Florida. A ribbon-cutting ceremony was held to inaugurate the chamber, which can accommodate air-conditioning systems up to 12.5 tons.

A state-of-the-art laboratory for the testing of HVACR equipment, Danfoss' new customer Application Development Center will, in total, feature three sets of psychrometric rooms capable of testing air-conditioning systems, including residential equipment and rooftop units from 2.5 to 50 tons and air-cooled chillers up to 150 tons.

"With the broadest portfolio of components to help chiller and rooftop manufacturers achieve bold levels of energy efficiency, Danfoss technologies play an important role in improving how buildings consume energy and impact the world around them," remarked Jurgen Fischer, President of Danfoss Cooling Solutions. "Danfoss has a long history, more than 80 years of innovation, and we remain committed to working with our customers to push the boundaries of innovation and energy-efficiency and climate-friendly solutions. This laboratory joins a family of Application Development Centers around the world that are actively working to advance our research and development initiatives and help our customers engineer tomorrow."

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Left to right: John Galyen, President of Danfoss North America; Dustin Daniels, Chief of Staff for Office of the Mayor, Tallahassee; Ricardo Schneider, President of Danfoss Turbocor Compressors; and Jurgen Fischer, President of Danfoss Cooling Solutions.

"One of the major drivers behind the significant investment in this Application Development Center is the increasing federal regulations and testing requirements impacting the HVACR industry, including aggressive energy-efficiency standards from U.S. Department of Energy and new targets for environmentally-friendly, low-GWP refrigerants from U.S. Environmental Protection Agency," said John Galyen, President of Danfoss North America. "This Application Development Center will allow us to help our industry prepare for the transition ahead by providing much needed lab capacity to ensure compliance."

Stefan Pietrek, Senior Director of Global Applications for Danfoss, explained, "The Application Development Center is set up to support testing specifically for the North American air-conditioning segment, comprising rooftop units and chillers in climatic controlled chambers. The test chamber we opened today is designed to test residential air-conditioning and light-commercial equipment of 2.5 to 12.5 TR. We are using the broad Danfoss portfolio of products to offer a complete solution to our customers including controls, compressors, line components, heat exchangers, and frequency converters. This makes the Application Development Center a unique home for complete innovative solutions."

The ribbon-cutting ceremony also included a facility tour hosted by Danfoss' Alice Riemer, director, global laboratories; and Gregory Handzel, manager of the Application Development Center.

The Center's other two test chambers—one for up to 50-ton and another for up to 150-ton systems—will open in the coming months. The Application Development Center is expected to be fully operational in early 2017.

About Danfoss

Danfoss engineers technologies that enable the world of tomorrow to do more with less. We meet the growing need for infrastructure, food supply, energy efficiency and climate-friendly solutions. Our products and services are used in areas such as refrigeration, air conditioning, heating, motor control and mobile machinery. We are also active in the field of renewable energy as well as district heating infrastructure for cities and urban communities. Our innovative engineering dates back to 1933 and today Danfoss is a world-leader, employing 23,400 employees and serving customers in more than 100 countries. We are still privately held by the founding family.

For more information, visit www.danfoss.com.

Toshiba Carrier® VRF Now i-Vu® Compatible

Carrier is pleased to announce Toshiba Carrier Variable Refrigerant Flow (VRF) heating and cooling products can now connect seamlessly to the i-Vu building automation system, allowing building operators to manage their heating, venting, and air-conditioning (HVAC) systems around the clock, from anywhere. Carrier, a world leader in high-technology heating, air-conditioning and refrigeration solutions, is a part of UTC Climate, Controls & Security, a unit of United Technologies Corp. (NYSE: UTX).

The new "i-Vu ready" Toshiba Carrier VRF interface enables seamless communication between the i-Vu building automation system and the VRF equipment in the building. The functionality can be ordered as part of the Carrier VRF equipment offering, providing Carrier customers with a turnkey solution enabling building automation, in addition to the numerous benefits of the VRF system. Toshiba Carrier's VRF equipment provides climate control with flexibility, zoning options and energy efficiency.

The Toshiba Carrier interface allows building operators to monitor or control a multi-zone VRF system from anywhere using the i-Vu building automation platform - through a wall-

CHILLER & COOLING TOWER TECHNOLOGY PICKS

mounted touchscreen interface in the building or from any web-enabled device. Using this system, building operators can proactively manage occupant comfort levels inside the facility. Additionally, standard building automation features such as graphics, trends, reports, schedules, and alarms are enabled for VRF equipment. This allows operators to optimize energy usage, maximize equipment performance, assess and address building trends and resolve problems faster.

"Carrier and our Toshiba partners are working tirelessly to improve our products and services to provide our customers with enhanced control," said Meredith Emmerich, Carrier's managing director, Ductless & VRF. "This latest compatibility with the i-Vu building automation system marks another important milestone in our ability to deliver VRF systems that meet and exceed our customer's expectations."

"We are excited to add more Carrier equipment to the i-Vu-ready lineup", said Mark Jones, Carrier Controls' business manager. "With our seamless VRF/i-Vu solution, technicians can expect a dramatic decrease in commissioning time (from days to minutes), while allowing building operators to benefit from all the i-Vu system has to offer."

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 UTC Climate, Controls & Security, a unit of United Technologies Corp., a leading provider to the aerospace and building systems industries worldwide. For more information, visit www.carrier.com or follow @Carrier on Twitter.

For more information on Carrier VRF products or to find a Carrier expert in your area, please visit www.carriervrf.com.

SPX Cooling Technologies Announces New Marley® Series M Geareducer® Line

SPX Cooling Technologies, Inc., a full-line, full-service industry leader in the design and manufacture of cooling towers and other specialized heat exchangers, announces their new line of gearboxes, the Series M Geareducer. Series M Geareducers are designed and manufactured to directly and easily replace other OEM gearboxes in field-erected cooling towers.

The Geareducer's primary function is to reduce the speed of the electric motor to optimize fan performance. This gear drive goes beyond the American Gear Manufacturers Association (AGMA) requirements to maximize air movement through the cooling tower and to minimize maintenance. It provides primary support to the fan, anchors it against lateral movement, withstands shock loads at start-up and during speed changes, and minimizes power transmission losses and noise generation.

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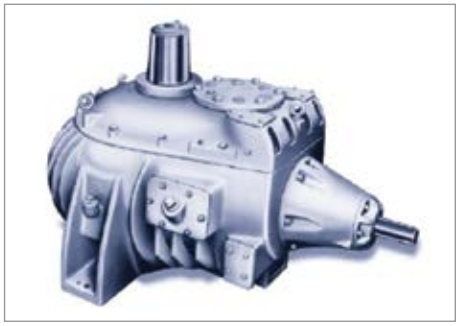

The new Marley® Series M Geareducer® reduces the speed of the electric motor to optimize fan performance.

The M series features gears of high strength, case-hardened alloy steel machined to AGMA Quality Class 9 and above. It is designed to fit into non-Marley cooling towers for easy replacement and has heavy duty double row interstage bearings for 100,000 hours of life or more. To further extend service life, it is fitted with large oil passageways to help maintain lower oil temperatures.

The new Geareducer operates without need for oil pumps, oil filters or oil coolers. It runs with two-stage gear reduction for efficient power transmission and the external cooling fins maximize the surface area for cooler operation. The new design aspects coupled with trusted Marley technology make the Series M Geareducer a match for any cooling tower.

About SPX Cooling Technologies, Inc.

SPX Cooling Technologies, Inc. is a leading global manufacturer of cooling towers, evaporative fluid coolers, evaporative condensers and air cooled heat exchangers providing full-service cooling solutions and support to customers in the power generation, petrochemical, industrial, refrigeration, and heating, ventilation and air conditioning (HVAC) markets for more than 100 years. For more information, please visit www.spxcooling.com. SPX Cooling Technologies and its product brands are part of SPX Corporation.

About SPX Corporation

Based in Charlotte, North Carolina, SPX Corporation is a leading supplier of highly engineered HVAC products, detection and measurement technologies and power equipment. With operations in about 20 countries, SPX Corporation had approximately $1.7 billion in annual revenues and approximately 6,000 employees worldwide in 2015. SPX Corporation is listed on the New York Stock Exchange under the ticker symbol, "SPXC." For more information, please visit www.spx.com.

For more information about SPX Cooling Technologies, visit www.spxcooling.com.

Budzar Announces Addition of Natural Refrigerant Chillers

Budzar Industries has announced the addition of Natural Refrigerant Chillers to their line of process fluid heat transfer systems. The term natural refrigerants refers to chemicals occurring in nature's biochemical processes. The major benefit of natural refrigerants is they do not deplete the ozone layer and have a negligible effect in terms of global warming. The most common natural refrigerants are Ammonia, Propane and Carbon Dioxide, although there are many others.

Used widely throughout Europe, interest in natural refrigerant chillers is growing in the United States. Companies want to ensure their future cooling needs are met as they will need to phase out HCFCs and HFCs. Low charge Ammonia is often the refrigerant of choice because it is safe, cost effective and energy efficient. The term low-charge indicates there is one pound or less per ton of refrigerant utilized.

Given the low content in the Budzar Industries' Low Charge Ammonia Chillers, the risk normally associated with conventional systems is greatly reduced. Also with the strong odor of ammonia it is immediately apparent if there is a leak. Other benefits of low-charge ammonia chillers include high efficiency, cost-effectiveness and most importantly they will never "phase-out."

Low charge Ammonia is often the refrigerant of choice because it is safe, cost effective and energy efficient. The term low-charge indicates there is one pound or less per ton of refrigerant utilized.

CHILLER & COOLING TOWER TECHNOLOGY PICKS

Edward George will lead the new line of Natural Refrigerant Chillers for Budzar Industries.

Edward George has been tapped to spearhead the new line of Natural Refrigerant Chillers for Budzar Industries. "Ed has extensive experience in our industry. He has been selling temperature control systems to the rubber, chemical, and pharmaceutical industries for many years. Ed has also developed the large, low temperature, chiller market for the food and LNG industries," said Dave Young, President of Budzar Industries.

"With the phase-out of HCFCs and HFCs, companies need an alternative and using natural refrigerants is the answer. Natural refrigerant chillers have been used in Europe for years and the US is just starting to catch up. Ammonia is cost effective and energy efficient, and with the ecological benefits it makes sense. Historically, the US used ammonia for artificial ice production in the 1800s, so, using ammonia as a refrigerant isn't anything new," said Edward George. "Our line of low charge ammonia chillers includes portable and skid mounted chillers and can utilize one pound, or less, of ammonia per ton which is incredibly safe. The natural refrigerant chillers are designed to be used in the chemical, pharmaceutical, ice rinks, food processing, dairy, HVAC and beverage industries," George continued.

"As specialists in process fluid heat transfer systems for over 40 years, Budzar Industries must continue to lead the way in the heating and cooling technologies," said Young. "As the premier supplier of custom process cooling equipment, we have the engineering, design and manufacturing experience to develop new cooling options. With Ed on board our position with natural refrigerants has been strengthened immeasurably."

About Budzar

Budzar Industries specializes in process fluid heat transfer systems. Since 1975, Budzar Industries has earned a reputation for quality and ingenuity in the design, engineering and manufacturing of temperature control systems. Today, Budzar Industries systems can be found throughout the world bringing accurate temperature measurement and control to the production of: pharmaceuticals, chemicals, petroleum, plastics, rubber, paper, power, steel and food.

To learn more about Budzar Industries, visit www.budzar.com

Aggreko Announces New 230-Ton Air-Cooled Screw VSD Chiller

Power generation, HVAC and oil-free air specialty rental company, Aggreko plc, has introduced a new 230-ton air-cooled screw chiller into its fleet. Powered by variable-speed technology, the units deliver best-in-class energy efficiency and increased fuel savings, and offer a wider range of process cooling capacity from 5˚F to 70˚F.

Designed in partnership with Johnson Controls, the chiller supports multiple applications across many industries. Some of the applications include, worker comfort cooling, food and beverage product development as

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The new 230-ton air-cooled screw chiller from Aggreko offers a wide range of process cooling capacity from 5˚F to 70˚F.

well as commercial and process applications where cooling plays a vital role to maintain operational output such as data center temperature control.

"Aggreko is proud to introduce our new line of air-cooled screw chillers giving customers another option to choose from when faced with incremental cooling capacity needs," said Bill Carrick, Aggreko's Managing Director of Temperature Control Services. "The new line perfectly complements our existing air-cooled chiller fleet, and allows Aggreko to provide another scalable, cost-effective solution to meet customer demand."

Variable-speed technology allows the chiller unit to operate at several different levels. These levels include a programmable operating setting, meaning it can operate at full capacity during production hours and then be set to a lower level during off hours, resulting in lower fuel costs.

The chiller equipment also offers customers the benefit of leveraging Aggreko's Remote Monitoring (ARM) services. ARM features Aggreko's 24/7 Remote Operations Center (ROC), a unique response service staffed by expert technicians diagnosing problems, remotely fix issues and proactively prevent failures when possible. ARM's services actively supplement customers' operations teams, delivering the added assurance their facilities, plants and events will continue to run smoothly, saving them unanticipated downtime and capital expenditure costs.

For more information, visit www.aggreko.com.

Bacharach HGM-MZ Monitor Detects Refrigerant Leaks Down to 1 ppm.

Bacharach has reduced the default low "leak" alarm level on their newly revised HGM-MZ; Halogen Monitor Multi-Zone while extending the default sample line length on this active continuous refrigerant monitor.

The recently introduced product upgrade reduces the leak alarm default value level to 10 ppm and extends the sample line lengths per zone to 450 ft (137.16 Meters).

"Our MZ will detect refrigerant leaks as low as 1 ppm. Other instruments just can't do that," said Mr. Tom Burniston, Product Manager, Fixed Instruments. "We saw a need for our customer's within the groceries and supermarkets to have the instrument set up to make use of this capability without reconfiguring it, and made the change for them. It will monitor over 16 different sampling points, with the possibility for extending the number of sample points to 48 with the introduction of splitter kits on each zone."

The newly reduced low "leak" alarm setting enhances the ability of the HGM-MZ to detect leaks early with "out of the box" factory settings, enabling the reduction of refrigerant loss, while reducing emissions of environmentally harmful greenhouse gases, and enhancing refrigeration system efficiencies, reducing energy costs and minimizing the risk of lost inventories, such as produce within supermarkets.

Bacharach is committed to delivering customers refrigerant leak detection instrumentation that not only exceeds performance expectations, but is quick and easy to install, configure and commission. The extended sample line length enhances this commitment, with a default setting that

The Bacharach HGM-MZ Halogen Gas Monitor Multi-Zone

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covers the typical maximum length used in most commercial refrigeration and food retail refrigerant detection installations. This helps to ensure that a valid sample from each monitoring zone reaches the HGM-MZ's proprietary precision NDIR (non-dispersive infrared) sensor, enabling the early detection of leaks.

For more information visit www.mybacharach.com

Trane and Telkonet Introduce New VRF Wireless Solution

Trane®, an Ingersoll Rand brand and leading global provider of indoor comfort solutions and services, has introduced a new variable refrigerant flow (VRF) wireless control interface through its business relationship with Telkonet, Inc. Telkonet is a manufacturer of intelligent room automation solutions, including hotel guest room thermostats and controls.

Trane® ProSpace™ VRF solutions are widely used in multi-zone buildings, like hotels, because they help keep energy costs low while allowing guests to adjust the temperature of their individual rooms for their comfort. The new Trane ProSpace VRF wireless control interface creates an open communication platform allowing Trane VRF systems to integrate with a room's thermostats and building-level control system.

"Optimizing energy efficiency is a priority for both hotel owners and facility managers. Thanks to the collaboration between Trane and Telkonet, hotel owners don't have to choose between their preferred HVAC and thermostat providers," said Jerad Adams, product manager at Trane, VRF systems. "The control interface gives customers the flexibility to pair a reliable, energy efficient VRF system from Trane with the thermostat specified in the hotel's brand guidelines."

The ProSpace VRF wireless control communicates information about the VRF's mode, fan speed, zone temperature, set point and error codes through the hotel's building automation system. This gives the facility manager access to data to help make informed maintenance and operational decisions that can increase energy savings.

The ProSpace VRF wireless control communicates information about the VRF's mode, fan speed, zone temperature, set point and error codes through the hotel's building automation system.

Hotel occupancy levels vary day to day; therefore, it can be challenging and time-consuming to monitor and adjust thermostat settings and energy demands in vacant rooms. The ProSpace VRF wireless control is equipped with motion and infrared sensors automatically turning the VRF system on and off when guests enter and leave the room, saving the facility manager time and further improving the hotel's energy efficiency.

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"As an industry leader in innovation and intelligent automation, Telkonet is proud of the opportunity to pair our EcoSmart™ energy management platform with the ProSpace VRF solution through our Telkonet Control Interface developed specifically for Trane," said Jason Tienor, Telkonet's CEO. "This collaboration provides the industry with an exceptional solution demonstrating increased comfort, expanded savings and improved control for hospitality owners."

Telkonet is an approved and preferred controls provider to many major hotel chains in North America. Telkonet's technology is extremely reliable, and the user-friendly interface makes it easy for hotel guests to set and adjust their room temperatures. The VRF wireless control interface is available through Trane field sales offices and is backed by the knowledge and support of Trane building professionals.

About Ingersoll Rand and Trane

Ingersoll Rand (NYSE:IR) advances the quality of life by creating comfortable, sustainable and efficient environments. Our people and our family of brands — including *Club Car®, Ingersoll Rand®, Thermo King®* and *Trane®* — work together to enhance the quality and comfort of air in homes and buildings; transport and protect food and perishables; and increase industrial productivity and efficiency. We are a $13 billion global business committed to a world of sustainable progress and enduring results. Trane solutions optimize indoor environments with a broad portfolio of energy-efficient heating, ventilating and air conditioning systems, building and contracting services, parts support and advanced control. For more information, visit www.ingersollrand.com or www.trane.com.

About Telkonet

Telkonet, Inc. (OTCQB: TKOI) provides innovative intelligent automation platforms at the forefront of the Internet of Things (IoT) space. Helping commercial audiences better manage operational costs, the company offers two product lines: EcoSmart and EthoStream.

CHILLER & COOLING TOWER TECHNOLOGY PICKS

The EcoSmart intelligent automation platform is supported by a full-suite of IoT-connected devices providing in-depth energy usage information and analysis, allowing building operators to reduce energy expenses. EthoStream is one of the largest hospitality high-speed internet access networks in the world, providing public internet access to more than 100 million annual users. Vertical markets that benefit from Telkonet products include hospitality, education, military, government, healthcare and multiple dwelling housing. Telkonet was founded in 1977 and is based in Waukesha, WI. For more information, visit www.telkonet.com.

Learn more at trane.com/prospace.

Innovative equipment offers benefits of evaporative and air cooling to meet demanding data center needs.

TSI APEX™ Cooling Technology for Data Center Cooling

Technical Systems (TSI) announces that its Adiabatic Pre-cooling Evaporative X-change (APEX™) cooling technology is ideal for use in the full range of data center cooling applications. APEX cooling systems combine effective, proven evaporative cooling technology with the simplicity of air cooling to deliver low-maintenance, highly efficient cooling. Data centers utilizing APEX cooling technology are able to save on the cost of power and drastically reduce reliance on water utilities. Technical Systems is a division of RAE Corporation.

While evaporative cooling is more efficient than air cooling in hot temperatures, it is associated with high water usage and treatment costs. APEX technology maximizes efficiency in all climates by only utilizing evaporative cooling technology when ambient air temperatures are high enough to render air cooling inefficient, which is also typically when energy costs are highest. During all other times, pre-cooling with evaporative technology is not needed and the water supply can be shut off. This is especially important in data center cooling applications, where power demand is high, and growing, and where effective cooling is critical to operations.

APEX technology is proven to improve cooling system efficiency by as much as 30-40%. Even so, APEX systems are able to run dry for as much as 85% of the year in most climates, leading to drastically reduced water costs over evaporative cooling systems. APEX systems incorporate adiabatic technology into packaged equipment such as chillers, condensing units, fluid coolers, and more, making it possible to reap the benefits of this cutting-edge technology in nearly any existing data center operation.

APEX-based systems are available with a range of optional features to further improve efficiency and reduce maintenance needs, including: a microprocessor to control the unit's functions; acoustical packages to meet customer sound requirements; water makeup and drain controls; and more. The systems have a smaller footprint than many other cooling options on the market, making them easy to install in existing data centers, as well as to plan for in new buildings.

About RAE Corporation

RAE Corporation, family-owned and headquartered in Pryor, Oklahoma, is an industry leader in the design and manufacturing of custom-engineered cooling and refrigeration systems. RAE's expertise allows the company to design top-quality systems to meet the specific needs of their customers. RAE designs and manufactures products in four divisions: Century Refrigeration, RAE Coils, Refrigeration Systems and Technical Systems.

For more information, visit www.RAECorp.com.

Safety Shower Water Tempering Systems COMPLY WITH ANSI Z358.1

By Rod Smith, Chiller & Cooling Best Practices Magazine

A Safety Shower Water Tempering System ready to ship to the customer

➤ Chiller & Cooling Best Practices Magazine interviewed Paul Heston (General Manager) and Tom Strock (Chief Engineer) from Hydrothrift Corporation.

Good morning. Could you provide an overview of the American National Standard for Emergency Eyewash and Shower Equipment (ANSI Z358.1)?

Good morning. In a nutshell, where workers are exposed to harmful chemicals, they must have eyewash and safety shower stations to decontaminate themselves in the event of a spill or splash. A variety of industries, including petrochemical, chemical, metal fabrication and laboratories, must plan for this contingency. The ANSI Z358.1 Standard specifies the water used for these purposes must be tepid or within a site-specified range. This means in colder climates, water must be heated, and in hotter climates water must be cooled.

In some very hot climates reaching temperatures like 122˚F (50˚C), the water available will be much too hot to use. In addition, this hot water could activate chemical substances and make things significantly worse for the victim of an accident. In colder northern climates, cold water could cause hyperthermia to the user. OSHA and ANSI decided this was an issue requiring attention and ANSI Z358.1 establishes requirements for eyewash and safety shower stations.

Awareness of this safety issue has created demand for our Safety Shower Water Tempering Systems. These systems are custom designed to control safety shower water temperature for various ambient conditions utilizing custom engineered chillers and heaters.

A 1500 to 2000 gallon storage tank can take the chiller size (in this hypothetical example) down to a 3 or 8-ton chiller depending on the ambient heating.

In very high ambient temperature locations, sun shields on electrical panels may be required.

What are some details in ANSI Z358.1 impacting your Safety Shower Water Tempering Systems?

The ANSI Z358.1 Standard is published by the International Safety Equipment Association and can be purchased from ANSI at https://webstore.ansi.org. It's a 28-page Standard but here's a brief sampling of items in the Standard impacting our safety shower water tempering systems. For Emergency Showers:

- Minimum volume of flushing fluid (20 gallons per minute) for a minimum specified duration (15 minutes)
- Flushing fluid supply flow pressure (30.5 psi)
- Installation will permit accessibility within a specific period of time (10 seconds)
- If freezing conditions are a possibility, freeze-protected equipment must be used.
- Deliver tepid flushing fluid. Facility safety professionals on-site should be consulted for specific temperature ranges if required.

Do engineering firms design centralized or decentralized Shower Water Tempering systems?

They design both. If it's a smaller facility requiring a single eyewash or safety shower station, they'll simply specify a 1-ton (or smaller) individual chiller for that one station.

In a large chemical plant requiring fourteen (4 to 36) eye wash stations, they will specify and design a centralized shower water tempering system. This cooling (or heating) system will temper water for all the shower stations. Tempered water is continually circulated through the piping to ensure consistent temperatures, within the specified ranges, at the eyewash and shower stations.

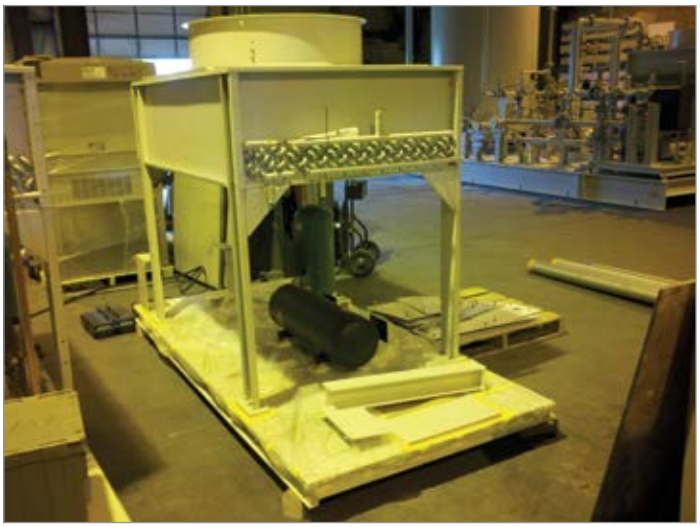
How do you assist engineering firms with engineering energy and water savings into the specifications?

The application engineering support we provide varies on the knowledge at the engineering firm. We've seen firms with everything designed while others contact us with very little information and need us to lay out the system for them efficiently.

We've seen some engineering firms and owners design for simultaneous use. As a result they have large flow rates of water being consumed. Some engineering firms say they need our system to temper the water from 122˚F (50˚C), down to tepid temperatures at whatever their makeup flow rate is.

For example purposes, this specification approach will result in a 100-ton chiller or more because they haven't incorporated a storage tank into the system design. Our application engineers identify the activation time of 15 minutes in the ANSI Z358.1 Standard, and typically they will have a limit of two (2) safety showers running at the same time. So if a system has (2) safety showers operating each at 20 gpm for 15 minutes, 600 gallons of water will be withdrawn from

SAFETY SHOWER WATER TEMPERING SYSTEMS COMPLY WITH ANSI Z358.1



Special air-cooled condensers designed for 131˚F (55˚C) ambient temperatures and Class 1 Div 2 fan motors, Heresite-coated coils for corrosion protection.

the tank and 600 gallons of potentially very warm makeup water will be added. By sizing the tank sufficiently large, we can maintain the temperature within the allowed temperature ranges and then use a smaller chiller to reduce and then maintain the water temperatures over a longer period. With the tank's thermal storage, a 3 to 8 ton chiller is adequate in contrast to an 80 ton chiller if the makeup water was cooled instantaneously. This specification strategy can greatly reduce the capital and operating costs of chillers.

That's a big difference! Any other issues relating to storage tank selection?

The big thing is for owners and engineering firms to properly size the tank, to prevent the over-sizing of the chiller. Often some engineering firms are set in their ways and don't want to go back to the owner and change the specification. The earlier in the process they contact us, the better.

The ANSI Z358.1 Standard also establishes the requirement of tanks needing to be able to support the safety shower requirements if the makeup water is cut-off or unavailable. Design engineers will make sure the tank is large enough and has enough thermal inertia associated with it – to handle a big demand event. You hopefully have enough cooled water in the tank. It's not a real difficult calculation to go through the thermal system. The engineering firms mostly do this process engineering work and determine the tank size.

In some cases we provide the tank. In other cases, the tank is provided by the owner or the engineering firm. Often these are difficult items to ship as they can be 15 to 20 feet tall. The tank is insulated as well as is all the piping in the safety shower units. Similar to a commercial building, they are continuously circulating a small volume of flow, about 1 gpm, to provide an instant temperature response to demand. Insulation is normally installed at the job site as part of the final assembly and commissioning process.

Please describe your work with chemical and petrochemical plants classified as hazardous and in high ambient temperatures?

We have developed a particular expertise in custom designing systems for high ambient temperatures in what are often applications classified as electrically hazardous or potentially explosive. We often work on tough jobs that others can't (or prefer not to) work on. We welcome custom specifications.

We supplied forty-four (44) systems for the world's largest integrated petrochemical plant recently completed in Saudi Arabia. The Engineering, Procurement and Construction (EPC) firm worked with us to optimize the system design requirements which resulted in savings of about 30%. The specified ambient design temperature of 131˚F (55˚C), the "chilled" tepid water between 68 and 95˚F (20 and 35˚C), 122˚F (50˚C) makeup water to fill the tank, and the hazardous electrical areas eliminates off-the-shelf commercial refrigeration systems and isn't what off-the-shelf commercial refrigeration components are set up for. We have to do some things a little differently to make sure the refrigeration compressor is getting proper return temperatures and pressures, to ensure longevity. We normally use small semi-hermetic scroll refrigeration compressors - and they aren't designed for chilling water to a warm 70˚F.

We typically operate at high condensing temperatures of 155˚F (68˚C) for the 131˚F (55˚C) ambient dry bulb temperature. We then utilize refrigeration head pressure controls to maintain relatively high condensing temperatures. We use R134a refrigerant. Refrigeration compressors and evaporators are sized accordingly as we try to keep refrigeration compressor suction and discharge pressure within it's envelope. Crankcase pressure regulators and desuperheat expansion valves prevent excessive return temperatures and pressures.

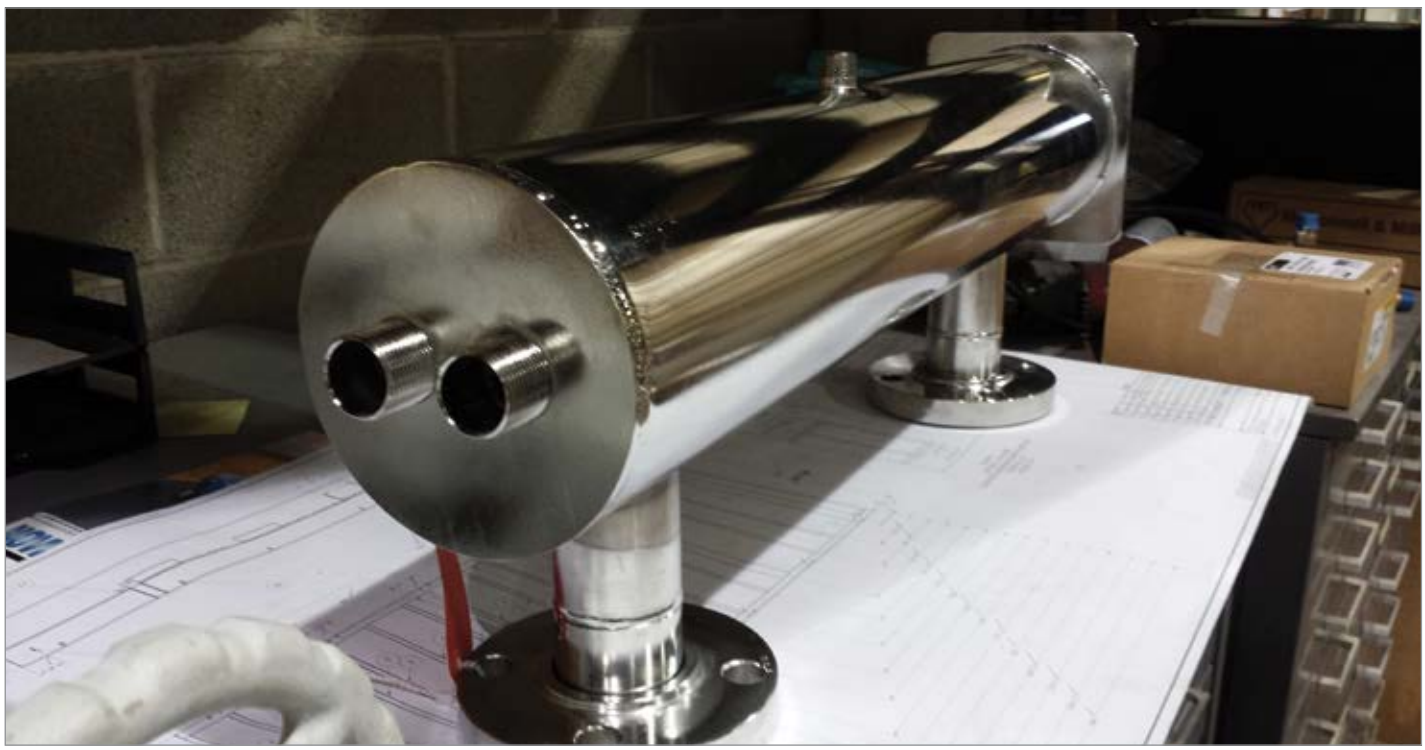
The classified hazardous locations limit what we are allowed to do with electrical controls. Our electrical controls are very simple because they are often in Class 1, Div. 2 explosive hazard locations. We can't use variable frequency drives and transmitters on refrigeration compressors and avoid these on purpose. Due to the remoteness of the locations, we also focus on using commercially available refrigeration tools and components such as thermal expansion valves, desuperheat valves, and hot gas bypass valves.

What kind of evaporators are used to maximize performance and worker safety and comfort?

That's a good question because we not only have to design for thermal performance, we have to ensure water quality for the shower. Mounted on the safety shower water tempering system skid, a double wall heat exchanger transfers heat carried by the safety shower water to the closed loop coolant system. Designed and manufactured to ASME pressure vessel code, the plate and frame or brazed plate heat exchangers are engineered and built for the most efficient operation and heat transfer.

The double wall design ensures any leaks do not contaminate the circulating safety shower water. The double wall is used on systems with potable water-to keep cooling medium from getting into potable water.

Very high efficiency evaporators used with double wall laser welded plates to isolate refrigerant from potable water.



Ultraviolet disinfection chamber renders microbes harmless

SAFETY SHOWER WATER TEMPERING SYSTEMS COMPLY WITH ANSI Z358.1

There are bypass valves around the chiller, pumps, ultraviolet sterilizing equipment and other components - so maintenance can be done.

Sometimes we also isolate the heat exchanger and refrigeration system with a closed loop propylene glycol system. With a propylene glycol system we can often operate the refrigeration system over a wider range of capacity and allow it to operate more efficiently at typical ambient temperatures. Without the propylene glycol system, we must concern ourselves with the possibility of freezing the water in the evaporator when ambient temperatures are lower and this then requires us to spoil capacity and maintain suction pressures with hot gas bypass valves.

Chillers usually don't have to run in the winter, but if it's too cold, we'll also place a heating circuit to add heat when needed.

Last but not least, some customers will request a UV sterilizer utilizing ultraviolet germicidal lamps to destroy microorganisms in the circulating safety shower water. The UV sterilizer includes quartz glass sleeves inside a stainless steel sterilizer chamber, high intensity ultraviolet lamps, lamp intensity sensor, and a UV controller and monitor.

What provisions are designed in for maintenance?

There are bypass valves around the chiller, pumps, ultraviolet sterilizing equipment and other components - so maintenance can be done. Skids may have multiple pumps, with 100% redundancy and bypass valves. The pumps can range from commercial stainless steel water pump to an ANSI frame mounted pump. Customers indicate their preferences with a pump specification.

Most engineering firms and owners are willing to work through specs and consider alternatives if there's sufficient motivation. We are happy to work with them on designing custom engineered solutions.

Thank you for your insights. BP

To learn more about Safety Shower Water Tempering Systems visit www.hydrothrift.com, email: sales@hydrothrift.com, tel: 330-837-5141.

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Healthcare HVAC ECMs Focus on DEMAND CONTROL VENTILATION

By Rob Boyajieff, Aircuity

HVAC systems can consume thirty percent (30%) of the total building energy needed in library, student union and classroom facilities. In laboratory and research facilities, the HVAC energy consumption can be up to sixty percent (60%). When one considers the data of traditional airside Energy Conservation Measures (ECMs), simple paybacks range from low-cost, quick paybacks to capital-intensive long paybacks. The ECMs range from simple strategies, such as night setback and/or supply air reset, to full air handler replacement or variable air volume from constant volume conversion. However, few ECMs deliver more than thirty-five percent (35%) savings for the entire university campus. Consider the ROIs on the project listed below:

ROI for Selected Lab Improvements

Project Name	Investment	ROI After Utility Rebate
Leading Cancer Research Center, New York	$7.9M	1.5 years

"Airside efficiency has arguably the most dramatic financial impact of any ECM when you consider on average, our airside efficiency projects have a payback of 2.5 years with an average of 38% energy reduction in buildings."

— Rob Boyajieff, Aircuity

HEALTHCARE HVAC ECMS FOCUS ON DEMAND CONTROL VENTILATION

Airside efficiency has arguably the most dramatic financial impact of any ECM when you consider on average, our airside efficiency projects have a payback of 2.5 years with an average of 38% energy reduction in buildings.

Airside Efficiency- Driving NPVs with Demand Control Ventilation

The following list of energy conservation measures is taken as the average cost and savings from five recently completed Energy Service Performance Contracts (ESPC) located in the U.S.. The spaces utilizing demand control ventilation (ECM #11 in Table 1) are primarily labs and vivarium. These types of critical spaces are high revenue producing, but also energy intensive environments consuming five to six times the energy compared to traditional office or academic space. They also provide significant opportunities for increased profitability via airside efficiency improvements.

When you consider the net present value (NPV) of the savings and the investment, over the term of ten years, the differences in NPV for the ECMs, with and without demand control ventilation (DCV), are shown in table 2.

The demand control ventilation (DCV) option by far has the best savings-to-investment ratio of 5.22 and yields more than $31 million in NPV over a ten-year term.

In our experience, owners have often applied basic strategies such as HVAC, night setback and supply air reset, so there is considerable opportunity for dramatic reduction via demand control ventilation.

Consider the following energy reduction metrics for a leading cancer research center, where labs were retrofitted with demand ventilation and variable air volume systems.

TABLE 1: AVERAGE ECMS COST AND SAVINGS INCLUDING DEMAND CONTROL VENTILATION (ECM#11) ASSUMES A 10-YEAR FINANCED TERM, 3.5% INTEREST RATE AND A 4.5% DISCOUNT RATE.

ECM #	ECM DESCRIPTION	EST SAVINGS ($)	EST COST ($)	PAYBACK (YR)	NPVS (NPV OF SAVINGS)	NPVI (NPV OF INVESTMENT)	SIR*
1	Controls System Retrocommissioning	$116,678	$44,100	0.38	$942,080	$41,367	23
2	Install VFDs	$93,888	$471,346	5.02	$1,028,891	$442,133	2
3	Pipe Insulation & Sealing	$55,670	$294,969	5.30	$610,071	$276,688	2
4	Submetering	$29,645	$447,880	15.11	$239,360	$420,121	1
6	Building Envelope Upgrades	$13,840	$209,273	15.12	$111,743	$196,303	0.57
7	Condensate Heat Recovery	$15,494	$73,721	4.76	$125,100	$69,152	1.8
8	Motor Replacement	$22,565	$165,275	7.32	$279,996	$155,032	1.8
9	Equipment Maintenance and Control	$43,571	$240,933	5.53	$351,799	$226,001	1.6
10	Solar Air Heating	$13,443	$238,813	17.77	178,430	$224,012	0.80
11	Demand Control Ventilation	$2,829,544	$6,328,840	2.24	31,008,183	$5,936,593	5.22
12	VAV Conversion	$112,928	$2,063,162	18.27	1,498,944	$1,935,292	0.77
13	Cooling Valves Upgrades	$16,052	$181,410	11.30	129,610	$170,166	0.76
14	AHU Repairs	$53,876	$621,247		435,002	$582,744	0.75
15	Interior Lighting Upgrades	$599,865	$10,491,279	17.49	6,573,751	$9,841,054	0.67
16	Install VFDs on Pumps	$2,942	$53,332	18.13	32,240	$50,026	0.64
17	Airflow Measuring Station Upgrades	$1,440	$19,393	13.47	11,624	$18,191	0.64
18	Building Envelope Upgrades	$15,608	$217,418	13.93	171,049	$203,943	0.84
19	DHW Heater Optimization	$32,384	$799,665	24.69	429,847	$750,104	0.57
20	HRU Installation	$19,177	$628,964	32.80	210,151	$589,982	0.36
21	Kitchen Exhaust Fan Controls	$19,829	$517,849	26.12	217,304	$485,754	0.45
22	Install VFDs on Pumps	$9,081	$203,829	22.45	99,513	$191,196	0.52
23	Pre Heat PIC Valves	$2,126	$41,363	19.46	17,163	$38,799	0.44
24	Airflow Improvements	$438	$10,459	23.87	3,537	$9,810	0.36
25	Controls Retrofit (Valves)	$8,105	$359,717	23.92	65,438	$337,422	0.36
	Totals	**$4,011,509**	**$24,680,137**	**6.15**	**$ 43,961,009**	**$23,150,520**	**1.90**

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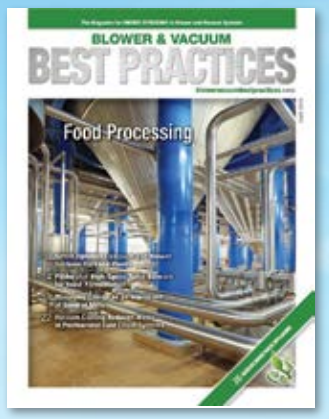

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TABLE 2: DIFFERENCE IN NET PRESENT VALUE IN PROJECT WITH AND WITHOUT DCV

	PAYBACK (YEARS)	NPVS (NPV OF SAVINGS)	NPVI (NPV OF INVESTMENT)	SIR*
Project with Demand Control Ventilation	6.15	43,990,747	$23,175,581	1.90
Project without Demand Control Ventilation	15.53	12,952,826	$17,213,926	0.75
Difference in NPV		31,037,921	5,961,655	

Savings

Annual Occ Energy Units Saved		Annual Occ Energy Cost Savings		
Cooling kWh	1,479,699	Cooling	$	207,158
Heating Therms	12,722	Heating	$	29,838
Reheat Therms	57,498	Reheat	$	101,139
Heating kWh	-			
Reheat kWh	-			
Supply Fan kWh	345,300	Supply Fan	$	48,342
Exhaust Fan kWh	179,797	Exhaust Fan	$	25,172
Total kWh	2,004,796	Total	$	411,649
Total Therms	70,220			
Peak kW	2,588			

Annual Unocc Energy Units Saved		Annual Unocc Energy Cost Savings		
Cooling kWh	3,710,374	Cooling	$	519,452
Heating Therms	46,120	Heating	$	108,169
Reheat Therms	172,968	Reheat	$	304,254
Heating kWh	-			
Reheat kWh	-			
Supply Fan kWh	852,934	Supply Fan	$	119,411
Exhaust Fan kWh	644,701	Exhaust Fan	$	90,258
Total kWh	5,208,009	Total	$	1,141,544
Total Therms	219,088			
Peak kW	4,251			

Annual Total Energy Units Saved		Annual Total Energy Cost Savings		
Cooling kWh	5,190,073	Cooling	$	726,610
Heating Therms	58,843	Heating	$	138,007
Reheat Therms	230,465	Reheat	$	405,393
Heating kWh	-			
Reheat kWh	-			
Supply Fan kWh	1,198,234	Supply Fan	$	167,753
Exhaust Fan kWh	824,497	Exhaust Fan	$	115,430
Glycol Pump kWh	-	Glycol Pump	$	-
Total kWh	7,212,804	Total	$	1,553,193
Total Therms	289,308			50%
Peak kW	2,611			

Table 3: Energy Savings Metrics for Lab Retrofits at a Leading Cancer Research Institute in New York, Resulting in Approximately 50% Energy Cost Reduction

Optimized Ventilation and Data Driven Analytics

In past practice, facility managers as well as environmental, health and safety professionals typically set these spaces at fixed rates. They did not have the means to continuously monitor air contaminants such as TVOCs, particulates, and CO_2 to determine the optimal airside efficiency. Laboratory ventilation rate guidelines are usually applied as constants, with the chosen ventilation rate rarely dynamically controlled or otherwise tailored, to the occupancy or conditions of the lab. This practice neither optimizes energy efficiency nor safety. Some guidelines simply recommend a range of 4 to 12 air changes per hour. The result can be excessive ventilation and data not driven by analytics.

For example, the airside efficiency program reflected in Table 3 is based on retrofitted spaces initially operating at fixed air change rates of 9.3 for labs and 20 for vivarium spaces. Through DCV, the air change rates were optimized and now operate safely at 6 air change rates for labs and 8 for vivarium spaces. This yields approximately 50% energy reduction for the building! Meanwhile facility managers and EH&S now have data on the operation and use of their buildings.

Healthy Buildings

Airside efficiency is an ECM going beyond impressive energy savings- it improves the indoor environment for occupants as well. Historically commercial buildings have been ventilated with fixed amounts of fresh air, and are commonly over-ventilated during low occupancy and under-ventilated during full occupancy. The problem with fixed rates is building occupancy is diverse and occupants require the proper amount of fresh air for healthier environments and optimal productivity.

During the energy crisis in the 1970s, building owners in that era recognized the high cost of ventilation and took matters in their own hands and limited ventilation. ASHRAE recognized this, and this lead to increased fresh air requirements via ASHRAE 62.1. To go even further, USGBC recognized an increased concentration of key pollutants, including particles, nitrogen oxide, volatile organic compounds and allergens, affected occupant productivity and maintained that better IEQ led to a decrease in number of self-reported symptoms (Joseph G. Allen, 2016). Buildings today can be challenging environments to provide proper environmental control, so why would we want to statically control fresh air delivery for buildings that are increasingly diverse?

Airside efficiency solutions provide the flexibility required to effectively monitor the indoor environmental quality, and then inform building management systems about changing conditions to properly adjust HVAC settings. The result is the right amount of ventilation for almost all types of situations. This leads to healthier buildings, more productive employees and ultimately a more profitable building as well. BP

About the Author
Rob Boyajieff is a Strategic Account Manager for Aircuity responsible for developing strategic accounts and partners in the Healthcare, Higher Education, and Life Science markets in New York and the Southeast.

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COOLING TOWER GEARBOXES EVOLVE to Address Customer Requirements

By Jerome Jennings, SPX Cooling Technologies, Inc.

As fan diameters increase, the fan speed must decrease to maintain acceptable sound and vibration levels.

Industries requiring process heat rejection often use field-erected cooling towers to keep pace with their heat load. Cooling towers have large fans and powerful motors, presenting a host of challenges, including excessive sound, vibration and expense. Gearboxes are employed to address these challenges.

Gearboxes Play a Key Role to Multiply Torque

Gearboxes are used as speed reducers to slow the rotational speed from the incoming motor to the outgoing fan of a cooling tower.

Companies operating high-capacity production plants, such as those in the chemical process and power industries, require cooling towers with large amounts of heat rejection capacity.

Without gearbox technology, cooling tower motors would be massive to directly handle the torque required by the fan. Something so large and heavy would be too expensive and impractical. Instead, the speed reduction from the gearbox acts as a torque multiplier, keeping the motor a reasonable size and the overall mechanical system more cost-effective.

The speed reduction from gearboxes also optimizes the performance of the cooling tower fan. As fan diameters increase, the fan speed must decrease to maintain acceptable sound and vibration levels, as well as to

> "A viable new alternative for gearbox replacements is important to plant operators. The M Series eliminates time-consuming conversion parts, such as fan hubs, driveshafts and adapter plates, as well as the added material costs and field labor time they require."
>
> — Jerome Jennings, SPX Cooling Technologies, Inc.

ensure the structural integrity of the fan itself. Improper gearbox sizing as it relates to the motor and fan can result in excessive vibration, loud operation and structural damage to the tower.

In large cooling tower applications, the fan typically operates at a speed between 100-200 rpm. The most common motor speed is 1800 rpm, requiring the average gearbox to reduce motor speed by approximately 9-18 times to achieve the desired fan speed. The exact combination of this gearbox ratio, fan blade design and fan pitch contributes to the specific performance and energy efficiency of the cooling tower in a given application.

Cooling Tower Customers Seek Solutions to Common Gearbox Problems

Cooling tower operators and maintenance engineers cite several common pain points associated with gearbox operation and service:

Issue 1: High operating temperatures, contributing to shorter operating cycles, premature gearbox failure and unplanned downtime.

Issue 2: Excessive sound and vibration levels, resulting in municipal noise violations, employee safety issues, equipment fatigue and premature failure.

Issue 3: Extreme temperature and humidity conditions within the cooling tower, quickly degrading mechanical systems, affecting sound level and life of gear sets.

Issue 4: Premature bearing failure and excessive wearing of the pinion shaft.

Issue 5: Few gearbox options and choices to support either scheduled or unscheduled maintenance and replacement.

Advancements in Gearbox Design Address User Needs

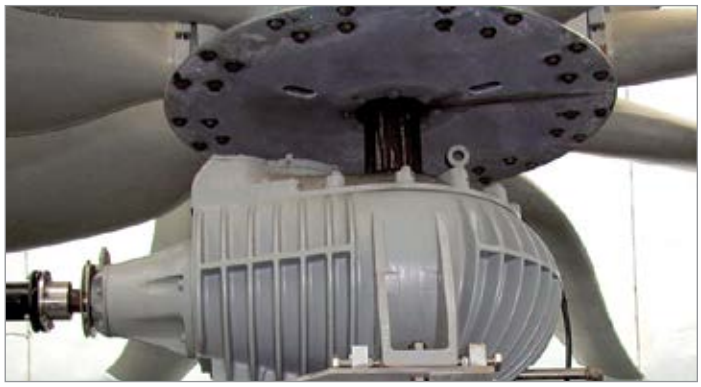
Continuous product research and development activities have led to several recent design innovations and product enhancements. SPX Cooling Technologies' engineers identified the following solutions to address the five gearbox operational issues most often cited by plant managers and maintenance engineers:

Solution #1: To address high operating temperatures, select a gear drive with integral "cooling fins" designed into the housing. In lieu of a smooth casting, the cooling fins increase surface area, allowing better heat rejection as air is pulled over the gearbox by the cooling tower fan. For example, Marley Geareducer® brand gearboxes include cooling fins, increasing the surface area by 25-47 percent compared to other cooling tower gear drives. Geareducers also incorporate large internal oil ports to keep oil well-circulated and contribute to overall cooler operating temperatures. The results: Oil life is extended, fewer oil changes are required, and gears and bearings are properly lubricated to maximize performance and service life.

Solution #2: To dampen excessive sound and vibration levels associated with gearboxes, select for robust metal castings. Choose a gearbox

Gearboxes are used as speed reducers to slow the rotational speed from the incoming motor to the outgoing fan of a cooling tower.

COOLING TOWER GEARBOXES EVOLVE TO ADDRESS CUSTOMER REQUIREMENTS



To address high operating temperatures, select a gear drive with integral "cooling fins" designed into the housing.

engineered to minimize the case deflection associated with the immense torque and thrust loads specific to cooling tower duty. For example, Marley Geareducers feature up to 40 percent thicker castings and are designed and built expressly for cooling tower service. The results: Quieter, safer working conditions, less metal fatigue and longer service life.

Solution #3: To counteract the extreme temperature and humidity conditions cooling tower gear drives are subjected to, steel shims at case connection points offer advantages. Steel shims, in lieu of plastic versions, are incorporated into all Marley Geareducer designs. Plastic shims exposed to temperature and humidity conditions within the tower can creep over time, causing changes in tolerance that affect the sound and life of the gear sets. The results: Steel shims maintain proper gear settings and control gear sound under extreme operating conditions.

Solution #4: To guard against premature bearing failure and excessive wearing of the pinion shaft, use heavy-duty double row interstage bearings. Bearing life of 100,000 hours is routinely achievable. A premium-grade isolator-type bearing oil seal with fixed stator sealing surface to prevent shaft wear is also recommended in lieu of a lip type seal that wears against the pinion shaft. To illustrate, Marley Geareducers incorporate an Inpro/Seal* bearing isolator which extends seal life without the downside of excess wearing of the shaft. The results: The use of heavy-duty double row bearings and oil seals can protect gearboxes from premature wear and extend service life.

Solution #5: To expand gearbox repair or replacement options and choices for either scheduled or unscheduled maintenance, choose a reliable supplier with specific knowledge of gear drives and an extensive inventory of cooling tower componentry. For example, SPX Cooling Technologies offers a dedicated in-house gearbox evaluation team, experienced in the inspection, repair and rebuilding of both Marley and Amarillo brand gearboxes. Gearbox repairs are completed at the SPX manufacturing plant, rather than contracted to job shops. To speed completion, avoid delays and additional costs, transportation to and from the plant is included.

A New Option to Simplify the Replacement Process

A recent SPX engineering innovation has been the expansion of the Marley Geareducer line. The new M Series Geareducer, debuted in early 2017, simplifies replacement of gearboxes in field-erected towers that do not currently employ a Marley Geareducer. The M Series is a direct "drop-in" replacement for Amarillo brand gearboxes, with a matching footprint that greatly simplifies gearbox change-out procedures.

A viable new alternative for gearbox replacements is important to plant operators. The M Series eliminates time-consuming conversion parts, such as fan hubs, driveshafts and adapter plates, as well as the added material costs and field labor time they require. The reduced time and effort onsite means a safer installation and less overall downtime for the tower, and a more reliable and affordable installation for the plant.

The M Series combines the proven longevity and performance of robust housings and bearings with modern seal enhancements and built-in vibration transducer mounting. It can be expected to provide reliable service for 12 to 15 years, with proper maintenance, before major repairs or rebuilding is a factor. It doesn't require any external pumps, filters or coolers to run properly, sparing customers extra unexpected costs and other add-on components that could become problematic. The M Series Geareducer provides the solutions customers want from an industrial grade cooling tower gearbox.

Reliable Gearboxes Alleviate "Service Anxiety"

Plant operators and maintenance engineers must effectively manage a variety of cooling tower service issues, whether scheduled or unplanned. Finding common-sense, long-term solutions to the most common pain-points not only simplifies routine maintenance and repair operations, but goes a long way to alleviate service anxiety. Reliable gearboxes and dependable suppliers provide a sense of security that maintenance and service issues can be managed methodically instead of in crisis mode. BP

About the Author
Jerome Jennings is a global product manager for field-erected components at SPX Cooling Technologies, based in Overland Park, Kansas. For more information visit www.spxcooling.com

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INDUSTRIAL COOLING SYSTEM INDUSTRY NEWS

Aggreko Keeps it Cool for Moody Gardens' ICE LAND

When two million tons of ice arrived in October to help build Moody Gardens' ICE LAND: A Caribbean Christmas, Aggreko's team of technicians were on hand to keep it frozen for the holiday destination held in one of the southern United States' warmest climates.

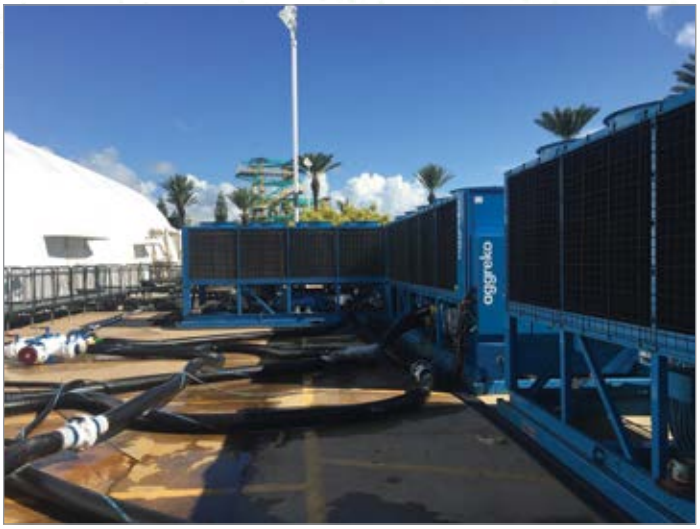
Aggreko is providing temperature control and power generation assistance for ICE LAND: Ice Sculptures, A Caribbean Christmas, taking place Nov. 12, 2016 – Jan. 8, 2017 at Moody Gardens in Galveston, Texas. The seasonal event boasts an award-winning team of master ice carvers from Harbin, China that transform two million tons of ice into an underwater journey including: a towering oil rig ice slide; sunken treasure; and schools of tropical fish, eagle rays, turtles, dolphins, hammerhead sharks and more.

Maintaining a temperature below freezing is critical to the success of any ice attraction, and it's particularly challenging in southeast Texas where temperatures can reach nearly 90˚F during the critical month of October, when most of the ice carving took place.

Aggreko's Event Services Division worked with Moody Gardens to beat the heat and designed a custom application engineered to support the ice show and cool more than 25,000 sq. ft. of tented event space to below freezing temperatures.

"Aggreko works closely with customers like Moody Gardens to overcome unique challenges and provide a level of engineering expertise and innovation that results in increased revenue and savings for their business," said Mel Parker, managing director, Aggreko North America. "We are proud to be part of this popular holiday event in Galveston and support the many temperature control applications required to give spectators a cool experience they will never forget."

The company's technical experts will monitor the installation via Aggreko's proprietary Remote Monitoring (ARM) service – a real-time monitoring and diagnostic tool - to ensure everything runs at peak efficiency.



Aggreko chillers working onsite to cool the two million tons of ice.

Aggreko is widely known for supporting custom-engineered temporary power and temperature control solutions for large-scale events, such as the Olympic Games, Pan American/Parapan American Games, PGA Tour, Commonwealth Games, Ryder Cup, and FIFA World Cup.

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Around the world, people, businesses and countries are striving for a better future. A future that needs power and the right conditions to succeed. That's why at Aggreko, we work round the clock, making sure you get the electricity, heating and cooling you need, whenever you need it – all powered by our trademark passion, unrivalled international experience and local knowledge. From urban development to unique commercial projects and even humanitarian emergencies, we bring our expertise and equipment to any location, from the world's busiest cities to some of the most remote places on earth. Every project is different, so we listen first and design a system around you, delivering our service and support anywhere, to any scale. Transforming the lives and livelihoods of individuals, organizations and communities across the globe.

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INDUSTRIAL COOLING SYSTEM INDUSTRY NEWS

Daikin and Gardiner Join Forces

Daikin Applied and Daikin North America have joined forces with Gardiner to strengthen its sales, service and solutions capabilities. Gardiner became the factory sales and parts representative in Northern Ohio and acquired Daikin Applied's service business for the Cleveland market.

"Our mission has been and will continue to be to build mutually beneficial business relationships with our clients and associates," said Bob Case, Gardiner's CEO. "Daikin has a culture of innovation and a strong desire to keep growing, best positioning us to be able to do that now and in the future."

By representing Daikin, Gardiner moves on from its relationship with Trane, established in 1962. Case cited Daikin's plans for growth and partnerships with independent manufacturer representatives as factors in the deal. "We respect their forward-looking philosophy including understanding the importance of independent representation. We're well-aligned strategically. For both our clients and associates, it's great news that Gardiner will continue to be an independent, locally managed company serving the Northern Ohio market well into the future."

The move signals both Daikin and Gardiner's commitment to clients. Providing one face to the client for equipment and service streamlines clients' experience with Daikin, enhancing response to customer needs. Gardiner is the top equipment representative and commercial HVAC service provider in the market; their considerable breadth of solutions expertise and capabilities significantly expands Daikin's ability to serve customers in the territory.

Daikin Applied's EVP of Sales, Marketing and Aftermarket, Kirk Thorne, believes this change will continue to fuel Daikin's competitive advantage in the market. "Daikin values our independent representatives' customer focus and entrepreneurial culture," Thorne said. "Our Reps are the best in the industry, and our appointment of Gardiner makes us an unmatchable force in sales, service and solutions." Thorne adds, "Daikin also values the diverse line card developed by Gardiner over the years. It is the strength of Daikin's products and Gardiner other highly valued brands and capabilities that will allow us together to successfully serve the overall needs of the marketplace."

Thorne emphasized Daikin's strategies are market based. "This joint effort is well suited to the market conditions and capabilities of Gardiner in Northern Ohio. Every market is different and we will continue to evaluate each of our markets individually to ensure we have the right structure and relationships to best serve our customers. Our end goal is to create the best outcomes for our customers, by investing in top talent to build the strongest organization in the marketplace."

Daikin would like to thank Wadsworth Solutions, its previous equipment representative in the territory, for its contribution to Daikin during its tenure as its equipment sales representative. Likewise, Gardiner expressed appreciation for their long, storied history with Trane. Both Daikin and Gardiner are committed to supporting their existing customers and projects in the marketplace throughout the transition.

About Daikin North America

Daikin North America LLC (DNA) is a subsidiary of Daikin Industries, Ltd. DNA and its affiliates manufacture heating and cooling systems for residential, commercial and industrial uses sold via a select network of manufacturer representatives, distributors and HVAC contractors. Manufacturing operations include facilities in Houston, TX and Fayetteville, TN. Visit www.northamerica-daikin.com for more information.

About Gardiner

Gardiner is a full-service HVAC, energy services and professional building services company serving Northern Ohio's commercial, industrial and institutional facilities, engineers and contractors since 1962. More than 2,500 clients in Northern Ohio trust Gardiner to solve their building comfort, reliability, energy, facilities planning and project funding challenges. To learn more call 440-248-3400 or visit, www.whgardiner.com.

INDUSTRIAL COOLING SYSTEM INDUSTRY NEWS

Danfoss Awards Smardt Chiller Group with EnVisioneer Award

Danfoss, a pioneer of oil-free, magnetic bearing, variable speed centrifugal compressors and a leading manufacturer of other high-efficiency components and controls for air-conditioning, heating, refrigeration, industrial, and water systems, announced that Smardt Chiller Group Inc. is the winner of its seventh annual EnVisioneer of the Year award in recognition of its Smardt Solar Integrated Chiller™ (SSiC).

Launched in 2010, the EnVisioneer of the Year award competition recognizes North American end users, municipalities, building owners, or original equipment manufacturers that have introduced a new product, opened a new facility, or invested in a building or system upgrade using Danfoss products or solutions to realize significant energy or environmental savings.

Smardt's SSiC™ integrates the energy-saving potential of Danfoss Turbocor® oil-free magnetic bearing compressors with solar-driven condenser fans into its air-cooled centrifugal chillers. The new chillers utilize a direct connection of a solar array mounted above the chillers to AC/DC condenser fans through Smardt's patent-pending Smardt SolarLogix controller. The number of fans run by the sun is based on the size of the solar array. As an example of the energy savings achieved, a 15-panel solar array string mounted above the fans will displace up to 25 percent of the load. As an added design benefit, the fans help to keep the backside of the solar array cool, which improves solar efficiencies, and the solar array also creates shade, which in turn slightly cools the air going into the chiller's condenser coils.

Left to right: Ricardo Schneider, President of Danfoss Turbocor Compressors; Greg Tutwiler, Chief Technology Officer of Smardt Chiller Group; Vince Canino, Global Chief Operating Officer of Smardt Chiller Group; and John Galyen, President of Danfoss North America.

SSiC eliminates the cost of utility grid equipment through a direct connection to AC/DC fan motors, and the oil-free Danfoss Turbocor® compressors help to reduce maintenance and noise. Plus, with IPLV efficiency improvements up to 15 percent, the system has proven to have a payback of less than two years in high-cost electricity markets.

The EnVisioneer of the Year award was presented on December 5 to Smardt's Vince Canino, global chief operating officer, and Greg Tutwiler, chief technology officer, by John Galyen, president, Danfoss North America, and Ricardo Schneider, president, Danfoss Turbocor Compressors, in Tallahassee, Florida, prior to the inaugural ceremony of the first Danfoss Application Development Center test chamber.

"Danfoss is pleased to recognize Smardt Chiller Group with the seventh EnVisioneer of the Year award," Galyen. "The SSiC is a great example of innovation that goes beyond expectations to raise the bar on energy efficiency. By integrating both renewable solar and energy-efficient oil-free, variable speed technology into its chillers, Smardt has demonstrated its commitment to engineering innovative solutions that are positioned to help the industry meet future energy standards while reducing costs."

"At Smardt, we see customer-focused innovation as our core competence. SSiC came together as a result of integrating several emerging technologies in one novel step. Outstanding teamwork between Smardt and our collaborators at Danfoss, EBM, Solar World, and SunModo was the key to bringing this new product to market so quickly," said Canino. "Smardt's core values as a global energy pioneer include technical rigor, focus on the customer experience, and creative collaboration with emerging technologies to improve and enhance that customer experience."

Smardt Chiller Group Founder and CEO Roger Richmond-Smith added, "Smardt was created to lead the revolutionary Danfoss Turbocor® compression technology into chillers with leading-edge controls, heat exchangers, and systems-integration technologies. As global number one in oil-free centrifugal chillers, continued innovation is the only way we can expand that role. It means our customers enjoy much lower

life cycle costs and can take credit for enormous reductions in GHG emissions across the globe."

The EnVisioneer of the Year competition is judged, and an independent third party judging panel chooses the winner.

About Danfoss

Danfoss engineers technologies that enable the world of tomorrow to do more with less. We meet the growing need for infrastructure, food supply, energy efficiency and climate-friendly solutions. Our products and services are used in areas such as refrigeration, air conditioning, heating, motor control and mobile machinery. We are also active in the field of renewable energy as well as district heating infrastructure for cities and urban communities. Our innovative engineering dates back to 1933 and today Danfoss is a world-leader, employing 23,400 employees and serving customers in more than 100 countries. We are still privately held by the founding family. Read more about us at www.danfoss.com

For more information about the EnVisioneer of the Year award program, visit http://www.danfoss.us/news/envisioneer-of-the-year/.

For more information, visit www.danfoss.us or www.smardt.com.

ASHRAE and IOR Strengthen Partnership with Signing of New MoU Agreement

ASHRAE and the Institute of Refrigeration (IOR) have signed a new Memorandum of Understanding (MoU) formalizing the organizations' relationship, which dates back more than a century.

The new MoU outlines how the two groups will work together more closely and with more defined parameters to continue furthering and promoting the advancements of cooling and heating related technologies. These include but are not limited to research; joint conferences and meetings; training and education programs; publication distribution and chapter collaboration.

"Strengthening our relationship with IOR is a natural and obvious decision. Both organizations are committed to harnessing and adapting new technologies and research to create a future where the built environment is healthier, more comfortable and more energy efficient," says ASHRAE President Tim Wentz, Fellow ASHRAE, HBDP. "The strides our organizations are making to produce a more sustainable world

Shown signing the agreement are Tim Wentz, ASHRAE President (left) and Stephen Gill, IOR President (right).

are exciting, and both ASHRAE and IOR are well poised to support each other's objectives immediately and moving into the future. We are pleased to formalize our relationship with this MoU and look forward to continuing a long association with IOR."

As part of the agreement, ASHRAE and IOU will explore ways to make technical information more accessible to both memberships. The MoU additionally places special focus on continuing to build and strengthen the organizations' global networks. As ASHRAE and IOR continue growing their memberships internationally, the possibility of joint events would benefit both groups. Co-hosting a conference or meeting would directly support global collaboration that could help further the impact ASHRAE and IOR have on the industries they serve.

"I am proud that we have refreshed the IOR and ASHRAE long-standing relationship through the signing of a new MoU, approved recently by both of our boards," says IOR President Stephen Gill. "This will underpin future collaborative work for both organizations. ASHRAE and IOR already share much of common interest in that both organizations represent a network of dedicated individuals who have a strong commitment to the advancement of our industry. We look forward to continuing to work closely together in the future, particularly in areas such as improving education and skills, disseminating technical publications and encouragement of improved standards – especially in refrigeration, air conditioning and heat pump areas of expertise."

INDUSTRIAL COOLING SYSTEM INDUSTRY NEWS

The MoU was signed by Tim Wentz and Stephen Gill as part of the CIBSE ASHRAE Technical Symposium 2017 at Loughborough University on April 6.

About ASHRAE

ASHRAE, founded in 1894, is a global society advancing human well-being through sustainable technology for the built environment. ASHRAE and its more than 57,000 members worldwide focus on building systems, energy efficiency, indoor air quality, refrigeration and sustainability. Through research, standards writing, publishing, certification and continuing education, ASHRAE shapes tomorrow's built environment today. More information can be found at www.ashrae.org/news.

About IOR

The Institute of Refrigeration (IOR) is a widely recognized individual membership organization in the refrigeration, air conditioning and heat pump field. It promotes the advancement of technologies and shares information through a wide range of UK and international initiatives for professional, technical and education standards, diversity, careers and profile raising for the sector. In this way it supports the advancement of cooling technologies and applications. IOR is a member of the International Institute of Refrigeration, recognized as an affiliate of the UK Engineering Council and represents members in 45 different countries globally. To learn more about IOR, visit www.ior.org.uk.

CxEnergy 2017 Sees Largest Attendance in Event History

With record attendance of nearly 550 building commissioning, energy management and test& balance professionals combined with the most sponsors and exhibitors in its history, CxEnergy 2017 broke all previous marks. Participants viewed the latest technologies, attended a wide array of educational sessions and workshops and enjoyed numerous networking opportunities.

The highly-rated 32-session technical program covered topics such as commissioning case studies in health care, government and commercial settings, existing building commissioning, datacenters, controls and automation, utility incentive programs, building envelope, chilled water systems, cyber-security, LED lighting, data analytics, the IoT; test & balance, finance and updates on ANSI & ASHRAE standards.

Speakers represented industry leading companies and organizations including the Department of Energy, Rheem, ABM, ComEd, Siemens, TLC Engineering for Architecture and more. Over 3,000 AIA continuing education credits were awarded to attendees. "Excellent conference and very qualified attendees," said Howard Wolfman of Lumispec Consulting, who gave a presentation on lighting system qualification in utility incentive programs.

With 55 sponsors and exhibitors, CxEnergy's expo hall showcased a wide variety of companies providing new products and services. Their offerings ranged from software, controls, instruments, and metering devices to consultative services in engineering and building management. "We have been exhibiting at CxEnergy every year and it has brought us good quality leads," said Heather Condon of Flexim, "We are very pleased with the show."

CxEnergy featured a Commissioning Authority (CxA) certification workshop by the AABC Commissioning Group, an Energy Management Professional (EMP) Seminar by the Energy Management Association

"I am proud that we have refreshed the IOR and ASHRAE long-standing relationship through the signing of a new MoU, approved recently by both of our boards."

— Stephen Gill, IOR President

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"The brewery saw savings, over mechanical cooling, of 85% when able to use a 100% free-cooling chiller during the coldest months."

– Rich Whitmore, President/CEO, Motivair Corporation
(feature article in August 2016 Issue)

"Demand for VSD is growing as the vast majority of industrial and HVAC installations are part-load."

– Roger Richmond-Smith, CEO, Smardt Chiller Group
(feature article in August 2016 Issue)

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INDUSTRIAL COOLING SYSTEM INDUSTRY NEWS

(EMA) as well as Test & Balance Seminar by the Associates Air Balance Council. EMA also selected a new Board of Directors, naming Bob Knoedler of Hanson Professional Services its new President.

Planning for CxEnergy 2018 is underway and presenting organizations are eager to build upon the success of the 2017 event. CxEnergy 2018's presenting organizations will announce the dates and location of the event next month.

CxEnergy is presented by ACG, Associated Air Balance Council (AABC) and EMA. Supporting organizations include the Florida Chapter of the Unites States Green Building Council, Alliance to Save Energy, Florida Engineering Society, Florida Institute of Consulting Engineers, Florida Green Building Coalition, Southeast Energy Efficiency Alliance, The Continental Automated Buildings Association and The Business Council for Sustainable Energy.

For more information please visit https://www.cxenergy.com.

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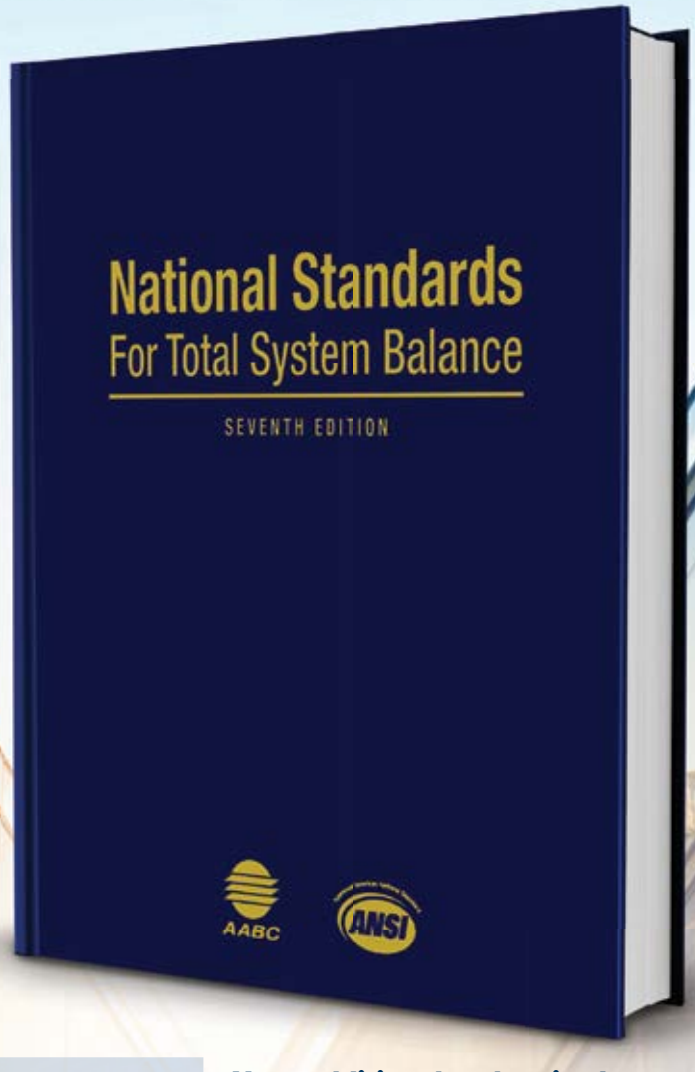

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