

CHILLER & COOLING BEST PRACTICES

coolingbestpractices.com

May 2017

INDUSTRIAL COOLING SYSTEMS

- 12 Sidestream Condenser Precipitator Yields Energy and Water Savings**

COOLING TOWERS & CHILLERS

- 18 VSD Chillers Deliver Energy Savings Under Real World Operation**
- 22 Adiabatic Cooling Keeps Pace with Growing Data Center Heat Density**

5 CHILLER & COOLING TOWER TECH PICKS





CONFERENCE - SEMINARS - TRADE SHOW



WEST COAST EMC[®] Energy Management Congress

June 7-8, 2017

Long Beach Convention Center, Long Beach, California

Energy Management, Power, Buildings, and Clean Technologies Expo

Explore promising new technologies, compare energy supply options, and learn innovative implementation strategies.

www.energyevent.com

— Presented By —



Other Energy Events

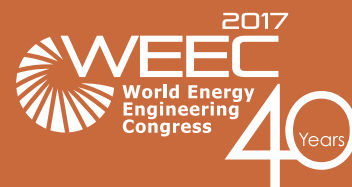
ATTENDANCE | 770.447.5083 x226

SEMINARS | 770.925.9633

EXHIBITS | 770.279.4386



www.globalconevent.com

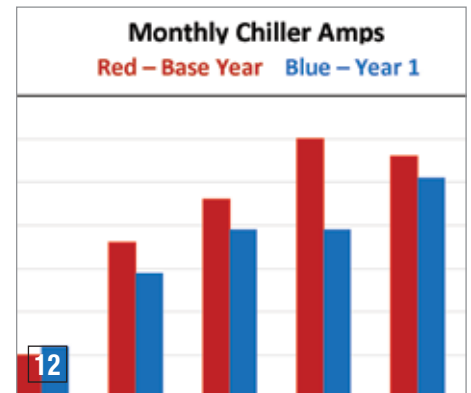


www.energycongress.com

INDUSTRIAL COOLING SYSTEMS

12 Sidestream Condenser Precipitator Yields Energy and Water Savings

By Dan Wheatley, CEM-BEP-CEA, Energy & Fluids, Inc.



COOLING TOWERS & CHILLERS

18 VSD Chillers Deliver Energy Savings Under Real World Operation

By Fred Berry, Johnson Controls

22 Adiabatic Cooling Keeps Pace with Growing Data Center Heat Density

By Adam Meyer, Technical Systems, Inc.



18

COLUMNS

4 From the Editor

5 Resources for Energy Engineers Chiller & Cooling Tower Technology Picks

25 Industrial Cooling System Industry News

33 Advertiser Index



22



FROM THE EDITOR



Over these past ten years, in my now “not so new” job in the magazine world, we have focused on publishing articles about many excellent *system* technologies able to significantly reduce energy and water consumption. These *system* technologies are often either able to reduce demand – or are designed to perform efficiently under varying load conditions.

A good example of a *system* technology is our first article titled, “Sidestream Condenser Precipitator Yields Energy and Water Savings.” Written by Dan Wheatley, who is a Certified Energy Manager (CEM), it outlines how this system can provide typical savings of 10-15% in chiller energy and 20-25% in makeup water. Sustaining clean condenser tubes can make a big difference and removing solids by precipitation has other maintenance benefits.

The system demands on mechanical cooling systems vary constantly. Fred Berry, from the Chiller Solutions team at Johnson Controls, writes in his article on VSD Chillers, “Using chillers with VSDs is a proven way to optimize energy utilization at full and part load, as well as under design and off-design conditions at varying ambient temperatures. In such cases, VSDs can cut a chiller’s annual energy costs by 30 percent or more.” His article reveals how this is accomplished in two ways; at part-load and at low-lift system conditions.

Adiabatic cooling is another *system* technology able to significantly impact water consumption. This is of great interest to applications with rapidly growing cooling demands-like data centers. Adam Meyer, from Technical Systems Inc., has provided an article on how adiabatic cooling can be applied to fluid coolers, condensers, condensing units, and chillers. Incorporating both evaporative and air-cooling into a single system, Meyer writes, “Unlike purely traditional cooling towers that constantly use water, the adiabatic system uses evaporative cooling only during the hottest part of the day and year. Air-cooling only loses efficiency under unusually high ambient temperatures, so these are the only times evaporative cooling is truly necessary. During the rest of the time the system meets the facility’s cooling load without using any water, operating as a simple air-cooling system.”

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

ROD SMITH

Editor

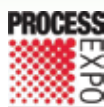
tel: 412-980-9901

rod@airbestpractices.com

EDITORIAL ADVISORY BOARD

Industrial Energy Managers	Brandon Aitken	Engineering Manager	Blackhawk Equipment
	Doug Barndt	Manager, Demand Side Energy-Sustainability	Ball Corporation
	Richard Feustel	Senior Energy Advisor	Leidos
	William Jerald	Energy Manager	CalPortland
	Jennifer Meier	Global EH&S/ Plant Engineering Manager	Varroc Lighting Systems
	Thomas Mort	Senior Auditor	Thomas Mort Consulting
	Brad Reed	Corporate Energy Team Leader	Toyota
	Brad Runda	Global Director, Energy	Koch Industries
	Uli Schildt	Energy Engineer	Darigold
	Thomas Sullivan	Energy Performance Manager	Michelin North America
	Bryan Whitfield	Paint & Powder Booth Specialist	Fiat Chrysler Automotive

2017 MEDIA PARTNERS





RESOURCES FOR ENERGY ENGINEERS

CHILLER & COOLING TOWER TECHNOLOGY PICKS

BAC Series 5000 – Industrial Grade Modular Cooling Tower

The Series 5000 Industrial Grade Modular Cooling Tower is the ultimate solution for industrial dirty water applications where performance, reliability and ease of maintenance are critical. Using BAC's advanced ENDURAFLOW™ Heat Transfer System which includes splash fill, the Series 5000 is able to withstand clogging from dirty water. With modular installation this tower also makes a perfect replacement for field erected towers in a fraction of the time. Pair that technology with the reliability of the ENDURADRIVE™ Fan System and our unique materials of construction and you're left with the most reliable, durable and easily maintained tower in the industry.



The BAC Series 5000 Industrial Grade Modular Cooling Tower

The Series 5000 exclusive features include:

- **ENDURAFLOW™ Heat Transfer System** – The patent pending system includes splash fill technology which prevents clogging and heat exchanger fouling, saving you time and money. It also is easy to maintain and allows for cleaning while the tower is in operation.
- **ENDURADRIVE™ Fan System** – The only variable speed direct drive solution for modular cooling towers that virtually eliminates maintenance and downtime.
- **EVERTOUGH™ Construction** – Designed and tested for the most adverse conditions, is offered as standard on the Series 5000 and includes the most corrosion-resistant option on every component including the TriArmor® Corrosion Protection System basin.
- **Flow range from 425 GPM to 4500 GPM**

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

New Industrial-Design Marley® CP Fiberglass Counterflow Cooling Tower

SPX Cooling Technologies, Inc., a full-line, full-service industry leader in the design and manufacture of evaporative and air-cooled heat exchangers, announces the Marley® CP fiberglass, induced draft, counterflow cooling tower, designed for space- and sound-sensitive applications. The CP tower features a stainless steel structure and fiberglass reinforced polyester (FRP) casing, which provides a strong, corrosion-resistant assembly. The Marley CP cooling tower is factory-assembled or ships in modules for easier field assembly.

The tower has a wide range of heat transfer fill media available to accommodate clean to very dirty water applications. Designed for the stringent requirements of industrial markets,

RESOURCES FOR ENERGY ENGINEERS

CHILLER & COOLING TOWER TECHNOLOGY PICKS

the tower can withstand water temperatures up to 176°F (80°C). The Marley CP tower provides a capacity bridge between factory-assembled towers and larger, field-erected towers.



The Marley® CP fiberglass, induced draft, counterflow cooling tower designed for space- and sound-sensitive applications.

All models feature an integral gear drive system and are available with low sound fan options. Triple-pass honeycomb air inlet louvers minimize freezing risk and reduce water loss from splash. Towers can be installed in a concrete basin, or an FRP basin can be provided. The counterflow design offers easy access to the collection basin from all sides. Multi-cell towers can be installed in-line or in a variety of back-to-back configurations.

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. 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 on the Marley CP cooling tower, visit <http://spxccooling.com/products/marley-cp-counterflow-fiberglass-cooling-tower>

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

For more information about SPX Corporation, visit www.spx.com

Carrier Previews AquaEdge® 19DV Centrifugal Chiller

Carrier unveiled, at AHR EXPO 2017, its latest innovation, the new AquaEdge® 19DV centrifugal chiller with Greenspeed® intelligence and a low Global Warming Potential (GWP) refrigerant. The breakthrough technology is being introduced in North America for the first time and delivers on customer demands for excellent performance, leading efficiency and environmental responsibility.

Improvements in compression technology and integration of Carrier's Greenspeed intelligence variable-speed technology enabled Carrier to significantly improve its centrifugal full- and part-load efficiencies. The result is the high-efficiency AquaEdge 19DV centrifugal chiller that saves energy costs and reduces environmental impact.

"The AquaEdge 19DV chiller technology represents our commitment to deliver climate control solutions that respect and surpass our customer's expectations for comfort and the environment," says Greg Alcorn, vice president and general manager, Carrier Commercial Systems.

The advanced two-stage compressor was designed and optimized for refrigerant R-1233zd(E), which has a GWP of 1.34 and an A1 safety classification per ASHRAE standard 34. The compressor's low-speed direct drive back-to-back design significantly improves efficiency while balancing internal forces, enabling the use of energy-saving ceramic bearings that utilize the refrigerant already in the chiller as lubricant. The intuitive touch screen user interface provides graphical trending and remote access capability and can be mounted on any corner of the machine. Its simplicity, flexibility and performance make the AquaEdge 19DV easy to own and operate.

PIC5+ controls for intelligent chiller management

Equipped with Carrier's latest achievement in PIC5+ intelligent controls, and integrated with the Carrier lifecycle data management system, the AquaEdge 19DV allows users to easily track and analyze the chiller's operational data, which helps to identify potential risks or areas for upgrading. The control system can also

CHILLER & COOLING TOWER TECHNOLOGY PICKS



Carrier's new AquaEdge® 19DV centrifugal chiller delivers climate control solutions and customer comfort with environmentally sustainable refrigerant.

be linked to the user's building automation system, enabling remote access to the chiller's running data in real time.

A smart connected chiller with Carrier® SMART Service

With the factory-installed addition of Carrier® SMART Service, building owners and facility managers can now experience a new level of equipment connectivity solutions including: remote diagnostics, long-term performance trending, benchmarking, decision analytics, and advanced notifications. By leveraging new insights derived from these capabilities, Carrier SMART Service can help improve equipment reliability and reduce energy usage, maintenance expenses and resource consumption.

High operational flexibility to respond to demanding situations

The AquaEdge 19DV adopts multiple technologies to optimize itself for robust operation in various demanding scenarios. For instance, the Greenspeed intelligence, together with the unique compressor design that deploys one inlet guide vane for each of two stages, supports stable chiller operation at all times, even at 10 percent part load. This means

consistent performance during off-peak hours in office buildings where computers operate at night. Also, PIC5+ controls allow swift restart in just 30 seconds in case of an unexpected power failure. This is extremely important for businesses like data centers where downtime can negatively impact their operations and bottom line.

"Carrier is invested in technology and in our ability to innovate for our customers," says Alcorn. "This thoughtfully engineered solution delivers the worry-free operation that our customers have come to expect from Carrier, at even higher efficiency levels and greatly reduced environmental impact."

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.

YOUR SOLUTION

**State of the art fluid chillers
to optimize your process cooling systems**

CTA®
NORTH AMERICA

Charlotte, NC USA
www.cta-na.com
980-259-6650

RESOURCES FOR ENERGY ENGINEERS

CHILLER & COOLING TOWER TECHNOLOGY PICKS

Delta Unveils New Anti-Microbial Cooling Tower

The risk of propagation of deadly cooling tower-borne pathogens, such as Legionnaire's Disease, can be minimized through the use of cooling towers made of anti-microbial HDPE. Legionella, the bacteria that causes potentially fatal Legionnaire's Disease, and other strains of deadly pathogens that are hosted by some cooling towers, have been substantially reduced by the development of a unique anti-microbial HDPE material introduced by Delta Cooling Towers (deltacooling.com).

Delta, which pioneered the HDPE (high-density polyethylene) plastic cooling tower in the 1970s, has just launched a line of towers constructed of anti-microbial resin, which is fully compounded into the base cooling tower material. The anti-microbial resin contains additives that operate on a cellular level to continuously disrupt and prevent uncontrolled growth of microorganisms and biofilm within the cooling tower. Efficacy tests were performed by Special Pathogens Laboratory, The Legionella Experts®.

Although the public concern about Legionnaire's Disease was paramount during the outbreaks of the mid-1970s, there have been many occurrences since then, including over a dozen cases in the U.S. in 2016, as well as several in Europe and Australia.

According to the CDC, in many of these cases Legionella is incubated and spread through water systems, including the cooling towers that are essential items in commercial building HVAC systems and industrial process cooling.

It has been well established that, under certain common conditions, cooling towers



The new Anti-Microbial Cooling Tower from Delta can propagate Legionella, a virulent bacteria that can produce severe lung infections. This has recently led ANSI/ASHRAE to publish its Standard 188, *Legionellosis: Risk Management for Building Water Systems*, which documents new risk standards and requirements for engineers that design new buildings and renovations to existing structures.

John Flaherty, president of Delta Cooling Towers, points out that the aforementioned standards and requirements do not significantly detail the maintenance practices necessary to keep water systems, such as cooling towers, healthy. He says that competent maintenance; consistent, top quality water treatment and accurate monitoring are essential to that effort.

"Without consistent, competent water treatment, the legionella risk is not completely eliminated, even with the new antimicrobial cooling tower," Flaherty explains. "While cooling tower conditions are often managed by water treatment chemicals, such treatment

is sometimes inadequate and poor piping designs, lead to 'dead legs,' creating an environment in which pathogens – including Legionella – can thrive."

Flaherty adds that cooling tower design and materials can be very significant in the prevention of pathogen growth. Also, the best water treatments for Legionella prevention are oxidizing biocides which react aggressively toward metal surfaces, effectively attacking metal-clad cooling towers and shortening service life. However, because Delta's cooling tower fills and shells are constructed of anti-microbial plastic, they are virtually impervious to corrosive water treatments and also minimize the risk of microbial growth. A 20-year factory warranty provides evidence of the durability of these HDPE cooling towers.

The design of many cooling towers creates pockets where water may stagnate, another condition that can lead to microorganism development. The stagnant water areas are prime breeding grounds for Legionella to grow. To avoid such problems, Delta's cooling tower designs feature a sloped basin and/or basin sweeper system.

While other cooling tower manufacturers may market a tower with an anti-microbial fill (the medium over which the hot water is distributed as it is being cooled), no company other than Delta has engineered a cooling tower featuring both the fill and structural casing composed of anti-microbial material.

**For more information, contact
Delta Cooling Towers, Inc., 185
US HWY 206, Roxbury Twp., NJ
07836; Phone: 800-289.3358;
Fax: 973.586.2243; E-mail: sales@deltacooling.com;
or visit the web
site: www.deltacooling.com**

CHILLER & COOLING TOWER TECHNOLOGY PICKS

Technical Systems Launches Series 35 Chillers

Technical Systems (TSI) announced the availability of its Series 35 Evaporative Cooled Chillers, which have been specifically designed to provide highly efficient cooling for commercial and industrial-duty applications, with an unmatched ease of installation and maintenance.

Series 35 Evaporative Cooled Chillers are complete, factory run-tested units that can be customized to meet individual customers' needs. They are 30-40% more energy efficient than air cooled chillers, and because they are a complete package sourced from a single manufacturer, they do not have the installation and maintenance difficulties of traditional water-cooled systems. This leads to lower installation costs and a decreased Total Cost of Ownership (TCO).

The Series 35 features an integrated unit controller to communicate to building management systems and ensures safe operation, as well as high efficiency, industrial grade screw compressors. These

units range in capacity from 50-500 tons in a single chiller package. They also feature fully-integrated pumping packages, and are available with a range of acoustic technology to meet the noise-sensitivity needs of any application. The chillers can be designed for total redundancy, ensuring continuous operation in critical applications. The flexible design options for the Series 35 Chiller packages makes it easy for customers to work with Technical Systems engineers to design a chiller package that meets their cost, capacity, and reliability needs.

The Series 35 Evaporative Cooled Chillers are UL and ETL certified, and are made-to-order and protected by a single manufacturer's warranty. Learn more about TSI's Series 35 Chiller technology from the Technical Systems website. Technical Systems is a division of RAE Corporation.

About RAE Corporation

RAE Corporation, family-owned and headquartered in Pryor, Oklahoma, is an industry leader in the design 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 about the high-quality, made-in-the-USA cooling and refrigeration systems manufactured by all four of the company's divisions, visit www.RAECorp.com.



Technical Systems Launched the Series 35 Evaporative Cooled Chillers

HydroThrift



**Need To
Reduce
Plant Water
Consumption?
We can help.**

**For more information
contact us at:**

www.hydrothrift.com

330-837-5141

RESOURCES FOR ENERGY ENGINEERS

CHILLER & COOLING TOWER TECHNOLOGY PICKS

Daikin Applied Recognized for Chiller Variable Volume Ratio Technology

Daikin Applied Americas has been recognized as a Manufacturing Leadership Award winner by Frost & Sullivan for outstanding achievement with its Variable Volume Ratio (VVR) technology.

As HVAC technologies evolve to better deliver higher efficiencies in building performance, lower cost, and less energy yielding a smaller carbon footprint, one problem has long challenged engineers: HVAC systems are often pressed to meet a building's occupancy demands for varying conditions. Daikin embraced and solved this challenge with the design and implementation of Variable Volume Ratio (VVR) technology in the new Pathfinder® air-cooled chiller.

With new VVR technology, the HVAC chiller's compressor senses the amount of lift needed in any given moment, and adjusts the compression ratio automatically. The result is that the compressor works only as hard as it needs to; and customers don't pay for over-compression which is likely occurring 95% of the time. VVR technology delivers optimal efficiency at any operating condition.

"VVR technology allows Daikin to offer our customers more flexibility, higher efficiency and a better overall chiller product," says Rob Landes, chiller product manager, "Each individual customer's needs are different and equally important; with VVR we can address each need in a highly reliable way."

The Manufacturing Leadership Awards, now in their 13th year, honor companies and individual leaders that are influencing the

future of global manufacturing. Manufacturing leaders have demonstrated achievement in a wide range of categories engaging in innovative projects to distinguish themselves from competition. Winners are chosen by a panel of expert judges for results that have delivered clear and compelling value, return on investment, and other tangible outcomes.

Daikin Applied will be recognized at the 13th Annual Manufacturing Leadership Awards Gala, which is to be held on the last day of the Manufacturing Leadership Summit, June 12-14, 2017 at the Hyatt Regency Huntington Beach Resort and Spa in Huntington Beach, CA.

About Daikin Applied

Daikin Applied, a member of Daikin Industries, Ltd, designs and manufactures technologically advanced commercial HVAC systems for customers around the world. Customers turn to Daikin with confidence that they will experience outstanding performance, reliability and energy efficiency. Daikin Applied equipment, solutions and services are sold through a global network of dedicated sales, service, and parts offices. For more information or the name of your local Daikin Applied representative, call 800-432-1342 or visit, www.DaikinApplied.com.

About Daikin Industries Ltd.

Daikin Industries, Ltd. is a Forbes 1000 global company with 2014 revenues of nearly \$16 billion and more than 60,000 employees worldwide, making it the largest HVAC manufacturer in the world. Daikin is engaged primarily in the development, manufacture, sales and aftermarket support of heating,

ventilation, air conditioning and refrigeration (HVACR) equipment, refrigerants and other chemicals, as well as oil hydraulic products. Daikin was named one of the world's most innovative companies by Forbes magazine. For more information, visit www.daikin.com.

About Frost & Sullivan

Frost & Sullivan, the Growth Partnership Company, works in collaboration with clients to leverage visionary innovation that addresses the global challenges and related growth opportunities that will make or break today's market participants. Its "Growth Partnership" supports clients by addressing these opportunities and incorporating two key elements driving visionary innovation: The Integrated Value Proposition and The Partnership Infrastructure. For more than 50 years, Frost & Sullivan has been developing growth strategies for the global 1000, emerging businesses, the public sector and the investment community. www.frost.com.

Embraco EMC Compressor Now Available in the U.S.

Embraco, one of the largest manufacturers of hermetic compressors for refrigeration, has introduced an industry-leading and environmentally friendly refrigeration solution, the EMC Compressor, into the U.S. market.

"We first unveiled the EMC Compressor at the 2016 International Air-Conditioning, Heating, Refrigerating Exposition (AHR Expo) and we are thrilled to now have the product in the market for our customers in the U.S.," said Michel Moreira, North America CCS Sales Manager, Embraco. "The EMC

CHILLER & COOLING TOWER TECHNOLOGY PICKS



The Embraco EMC Compressor Uses Natural Refrigerant R290.

Compressor is one of the most efficient R290 compressors available. It will not only help manufacturers meet the upcoming regulations for the U.S. market, it will also help improve energy efficiency and limit the impact on the environment.”

The EMC Compressor is a highly innovative compressor that uses natural refrigerant R290. It is designed for use in beverage coolers, vending machines, under-counter coolers and reach-ins. The EMC Compressor is one of the world’s most efficient single-speed compressors, consuming up to 30 percent less energy than traditional compressors currently sold in the United States. It features a smaller platform, with an extended cooling capacity that can replace larger compressors, releasing more internal space for the refrigerators.

“At Embraco, we are constantly investing in research and development to provide the most innovative cooling technologies in the market,” said Moreira. “The EMC Compressor is an example of how Embraco and natural refrigerants are changing the industry to provide sustainable and energy efficient products.”

Recognized with an Honorable Mention by the AHR Innovation Awards, the EMC Compressor works with zero Ozone Depletion Potential (ODP) and nearly zero Global Warming Potential (GWP), allowing manufacturers to meet the refrigerant regulation proposed by the US Environmental Protection Agency (EPA) SNAP program. Additionally, a cabinet using the EMC Compressor met the ENERGY STAR Version 4.0 specification for commercial refrigerators and freezers that will take effect on March 27, 2017.

About Embraco

Headquartered in Joinville, Santa Catarina, Brazil, Embraco is a multinational

manufacturer of hermetic compressors, the main component responsible for producing cold in refrigeration systems. With more than 12,000 employees and an annual production capacity of 39 million units, Embraco has emerged as a leader in highly innovative refrigeration technology. With offices and factories in China, Italy, Slovakia, Mexico, the United States and Russia, Embraco offers energy efficient refrigeration solutions to the global market. To learn more about Embraco visit www.embraco.com and to learn more about the company’s commitment to researching natural refrigerants visit www.naturalrefrigerants.info.



Synthetic Lubricant Manufacturer
For Ammonia · CO₂ · HFC · HCFC

NXT 717 Is the Best Solution

Let Us Show You Why

Low-Temperature Fluidity



Temperature (°C)	Popular Competitive Fluids (cP)	NXT 717 (cP)
30	~10,000	~10,000
20	~20,000	~10,000
10	~50,000	~10,000
0	~100,000	~10,000
-10	~200,000	~10,000
-20	~250,000	~10,000
-30	~250,000	~10,000
-40	~250,000	~10,000
-50	~250,000	~10,000
-60	~250,000	~10,000

1.800.503.9533 • www.iselinc.com • sales@iselinc.com

Sidestream Condenser Precipitator Yields ENERGY AND WATER SAVINGS

By Dan Wheatley, CEM-BEP-CEA, President, Energy & Fluids, Inc.

► ElectroCell Systems, Inc., located in Easton, Pennsylvania, manufactures a system for commercial, industrial and institutional facilities that is applied to conventional water-cooled chilled water plants. The system significantly improves efficiency in water and energy use with paybacks in the 2.0 to 3.5 year range.

The system is not a substitute for chemical treatment; rather it is a *Condenser Water Efficiency* system, engineered specifically and solely to increase water and energy efficiency by addressing the uniquely challenging demands that exist only in the condenser water loop. The system works alongside existing chemical treatment and enhances the effectiveness of the chemicals.

The self-contained system is installed in sidestream piping (in the manner of a filter or separator) and uses multiple technologies to capture and remove 95% to 99% of suspended solids and sustain a truly clean condenser system throughout the cooling season. The system also applies active flow enhancement technology to the return flow to induce



ElectroCell Systems patented Xc-6000 assembly

turbulence to improve heat transfer in the condensers, which reduces refrigeration compressor energy and lowers the heat of compression.

Typical savings are 10% to 15% in chiller energy and 20% to 25% in makeup water. Having clean condenser tubes reduces or often eliminates chiller tube cleaning and its associated costs.

Solids are continuously removed from the condenser water via precipitation and without the use of a media (e.g. sand, bags) so there is no additional labor-intensive maintenance. Solids removal is by precipitation.

The system has been in use for over ten years, and users include a number of Fortune 500 companies, some of whom have multiple sites. Systems are manufactured in a number of standard-sized assemblies and can be customized as needed.

Extensive Hands-On Experiences Inspired Advanced Design

The system was developed by Paul McLaine, owner and founder of ElectroCell Systems Inc. In the late 1990s, Mr. McLaine worked

extensively with a large pharmaceutical manufacturer to investigate the application of emerging technologies to improve water quality and treatment practices in their cooling plants.

Following technology evaluation and two years of beta testing at the manufacturer's facilities in New Jersey and Connecticut (which also included the development and patent of an electrostatic technology), the manufacturer established the application as a company Best Practice, and Mr. McLaine was contracted to implement the Best Practice in forty of the manufacturer's plants across the U.S. and worldwide over the next several years. In addition to the site improvements in water quality and treatment, the experience yielded some significant discoveries relevant to chiller plant performance.

Improvements in Chiller Energy Efficiency

Following the Best Practice application, an engineer on a site that had previously maintained completely clean chiller tubes, using acid treatment, tracked chiller energy through the cooling season.

FREE SUBSCRIPTION

DIGITAL EDITION FREE WORLDWIDE | PRINT EDITION FREE TO U.S. SUBSCRIBERS



You'll get
FOUR ISSUES
this year!



Subscribe Now!



Subscribe at **coolingbestpractices.com**

SIDESTREAM CONDENSER PRECIPITATOR YIELDS ENERGY AND WATER SAVINGS

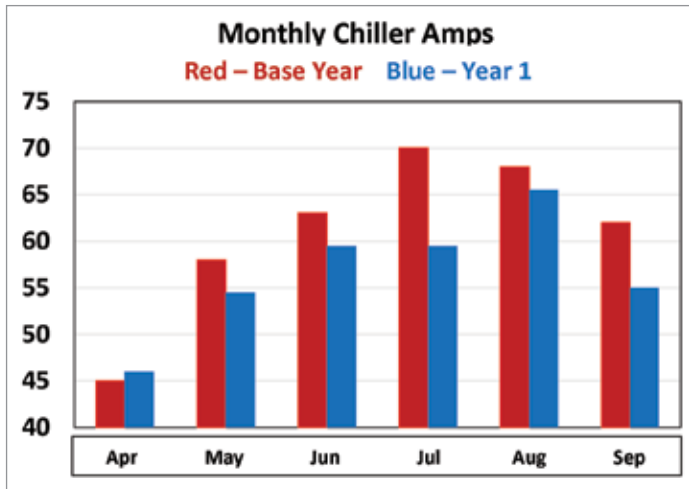


Figure 1: Monthly Chiller Amps

Although the cooling load had increased and the season had been warmer, the chiller showed consistent energy reductions, with a high of 14% reduction in chiller energy in the peak month of July. Inasmuch as the savings were welcomed, this amount of energy savings was unexpected.

Investigation into the cause of this led to a meeting with researchers at the University of Maryland, who had developed electrostatic applications for the U.S. military, and confirmed that the technology increases efficiency through enhanced heat exchange due to the electrohydrodynamic effect. The energy savings was a welcome (but unexpected) side effect of the Best Practices application.

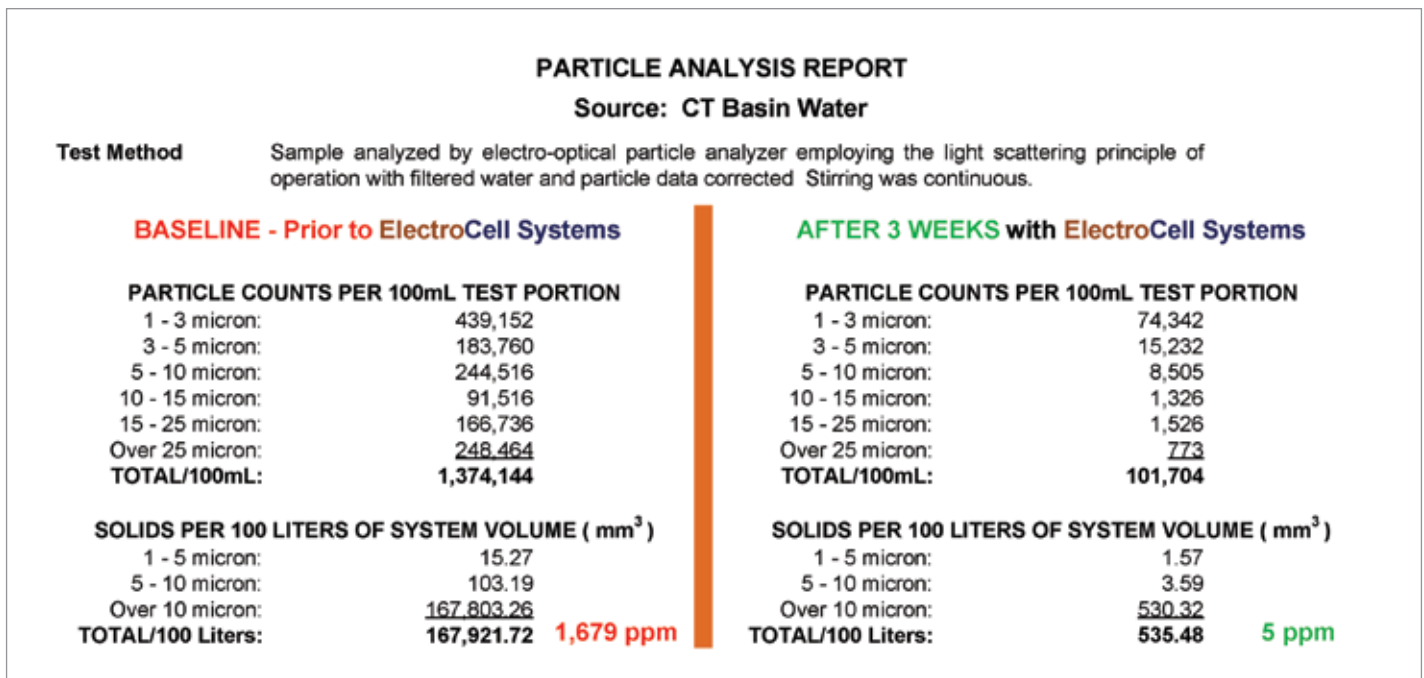


Figure 2: Report provided by an independent certified lab on solids control.



“The claims of 10%-15% chiller energy savings with the ElectroCell installation are sometimes initially met with skepticism, however, the savings opportunities are ‘hiding in plain sight’, so to speak.”

— Dan Wheatley, CEM-BEP-CEA, President, Energy & Fluids, Inc.

Ineffective Solids Control leads to State-of-the-Art Solution

A second significant discovery was in the importance of suspended solids control for good condenser performance, and frustration with the lack of effectiveness of existing filtering technologies. Solids removal was insufficient in keeping systems clean, and the labor-intensive filter maintenance was often postponed or skipped, which further reduced effectiveness. Mr. McLaine then investigated technologies and worked to design and develop a highly effective solids control system requiring minimum maintenance. A system which maintains effective solids control and also combined with heat exchange enhancement was developed and first released in 2003, and has also been enhanced over the years.

State-of-the-Art Solids Control and Removal

Cooling towers draw in particles from the atmosphere at the average rate of three pounds of solids per ton per year, which would be 4,500 pounds for a 1,500-ton chiller plant. The largest particles settle to the bottom, while smaller particles, which are much greater in number, remain suspended and travel through the system, creating numerous unwelcome conditions. A 2013 report by The U.S. Department of Energy *Side Stream Filtration for Cooling Towers* lists the benefits of solids removal as:

- Reduction in makeup water consumption
- Reduction in energy consumption
- Reduction in chemical use
- Lower cooling tower maintenance cost
- Control of biological growth

Figure 2 shows data provided by an independent certified lab showing effective solids control with an ElectroCell application. Samples are taken from the condenser water system main piping or at the cooling tower in order to get a system-wide measurement.

Energy Saving Opportunities Confirmed with Site Data

The claims of 10%-15% chiller energy savings with the ElectroCell installation are sometimes initially met with skepticism, however, the savings opportunities are 'hiding in plain sight', so to speak. An application begins with a chiller plant survey and data analysis to determine existing efficiency versus design efficiency.

FREE SUBSCRIPTION

DIGITAL EDITION FREE WORLDWIDE
PRINT EDITION FREE TO U.S. SUBSCRIBERS



**EVERY ISSUE CONTAINS
BEST PRACTICES FOR**

Cooling Towers
Central Plant Chillers
Cooling System Components

Subscribe Now!



Subscribe at
coolingbestpractices.com

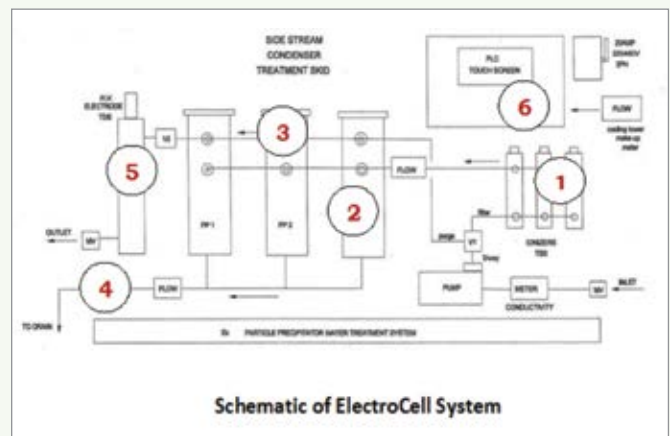
SIDESTREAM CONDENSER PRECIPITATOR YIELDS ENERGY AND WATER SAVINGS

Using industry-standard methods, formulas, and documentation, data is collected such as chiller running power, chilled water supply and return temperatures, evaporator flow, and design power according to load. Information is collected through site measurements, chiller logs, and manufacturer's data, and defines chiller performance versus design performance in kW/Ton. This is also used to develop a seasonal load profile to show annual kWh and reconcile this with annual makeup water use.

Surveys typically show kW/Ton at 10% to 18% over design efficiency, except during the first month of operation following tube cleaning. Chiller logs are particularly useful in showing how efficiency decreases through the cooling season due to accumulated fouling. Another useful metric is chiller approach temperature, which is the temperature difference between the condenser water return temperature and the saturated liquid refrigerant temperature. This is not used for power measurement but does indicate condenser heat transfer efficiency, which will also increase as fouling increases.

Sidestream Condenser Treatment System Operation and Technologies

- 1 Multiple ionization technologies piped in series induce electrocoagulation (also known as short wave electrolysis) by means of alloyed metals with low-voltage direct current pulsing of the cathode and anode. Solids (organic and inorganic) are normally held in solution by electrical charges. The addition of ions with opposite charges destabilizes the colloids, allowing them to coagulate. This increases the solids' mass causing it to settle out in the precipitators. Electrocoagulation is an established physical water treatment method and is a rapidly growing technology in wastewater treatment due to its ability to remove contaminants that are difficult to remove by media filtration or chemical treatment.
- 2 The pretreated condenser water passes into the much larger, parallel-piped precipitation vessels (PP-1, 2, 3, in center) and experiences a dramatic reduction in flow rate. Suspended solids with increased mass precipitate out of solution and settle to the bottom of the vessels.
- 3 Condenser water flows upward through static mixers that provide retention time and enhance uniform coagulation and further precipitation of solids.
- 4 When blowdown is required, flow is diverted through the vessel bases and carries the solids out to drain to accomplish the required blowdown. This method saves water by putting the blowdown to beneficial use instead of having to use separate backwash or purge cycles.
- 5 Flow leaving the precipitation vessels combines into a single pipe through the high voltage electrostatic treatment chamber. ElectroCell applies patented electrostatic treatment to (1) impart a negative charge on dissolved solids and remaining suspended solids in order to prevent precipitation out in the system, and (2) break the surface tension to induce turbulent flow in the condensers that break down the thermal boundary layer and enable enhanced heat exchange in the condenser.
- 6 The automation panel provides graphic display, all setpoints and controls for the system (e.g. blowdown, valve positioning, pump speed), logging of data (e.g., GPM flow, total filtered flow, total blowdown), interface to building automation, and remote access.



Savings projections are based upon improvement on most of the measured inefficiency and average 12%-13%. It is important to develop a high quality plant profile and show loading accurately since the electrical savings will contribute up to 80% of the payback.

Makeup Water Savings from Multiple Sources

Generating water savings projections are not as exact a science as developing an energy profile, since factors affecting water use vary more widely. Just half of sites surveyed have existing filtering, with only about half of filtering systems working as designed. The amount and type of solids being drawn into the cooling tower varies according to location and is affected by neighboring activities (e.g. construction, traffic). Makeup water quality also varies in solids and mineral content.

As a relatively inexpensive commodity, water cost savings will generate up to 20% of an ElectroCell system cost. Other benefits accrue as well (e.g. environmental impact, LEED points, corporate missions). Water savings derive from the following:

- Increased chiller efficiency means less kW/Ton, which results in a lower Heat of Compression (HOC). The HOC represents a parasitic cooling load added to the 12,000/BTU per ton, and a decrease in HOC means a corresponding reduction in evaporation, plus the reduction of the associated blowdown.
- The removal of 95% of the solids also contributes to less blowdown, since suspended solids elevate conductivity which triggers the blowdown cycles. Although the conductivity setpoint remains unchanged, solids removal results in less blowdown.
- Purge cycles, if present, are eliminated. If sand filters or separators exist on the baseline system, they are typically removed when an ElectroCell system is installed, and it accomplishes the blowdown. This removes precipitated solids without requiring a backwash or purge cycle.
- Sensible cooling will increase. Sensible cooling is defined as cooling of the condenser water that results from BTUs transferred to cooler surfaces such as primary pipe walls or cooling tower fill surfaces. Increased sensible cooling reduces water use since it does not require evaporation.

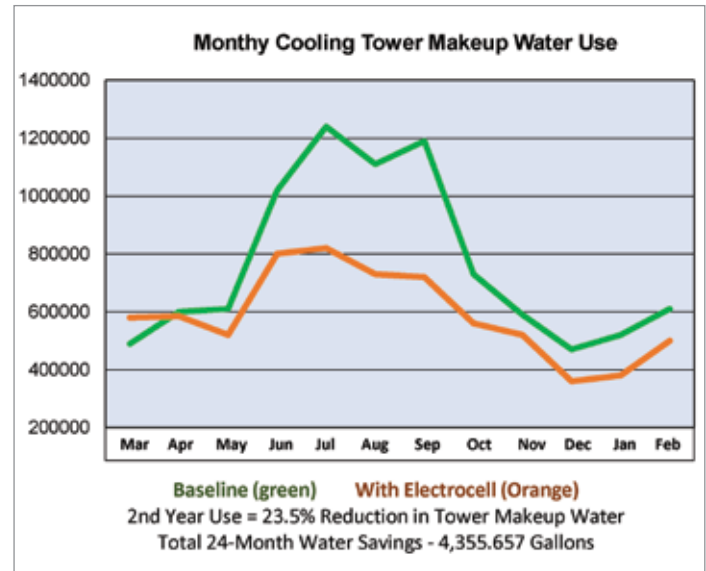


Figure 3: This 2012 installation at a data center facility recorded water savings of 23.5% over a 24-month period.

Conclusion

The ElectroCell System is applied to chilled water plants to maintain energy and water efficiency levels significantly superior than that which is normally encountered. The system uses state-of-the-art technologies for precipitation, heat transfer, and automation and is mature, patented technology that has been in use in a number of Fortune 500 companies for over ten years. Systems are applied in sidestream piping and will not require modifications to other equipment such as chillers, pumps or cooling towers. **BP**

Please contact ElectroCell Systems for further information, references, and to request a cooling plant evaluation without obligation. Please contact Paul McLaine, President, ElectroCell Systems, Inc., 3320 Nazareth Road, Easton, PA 18045. Tel: (800) 949-3445, email: info@electrocellsystems.com or visit www.electrocellsystems.com

The author may also be contacted for further information. Dan Wheatley, CEM-BEP-CEM, President, Energy & Fluids, Inc., Business Development, ElectroCell Systems, Inc. Tel: 617-834-8179, email: dan.wheatley@energyandfluids.net or visit <http://www.energyandfluids.net/>

To read similar **Cooling System Assessment** articles please visit www.coolingbestpractices.com/system-assessments/water-savings

VSD Chillers Deliver Energy Savings Under REAL WORLD OPERATION

By Fred Berry, Chiller Channel Manager East Region, Chiller Solutions, Building Technologies & Solutions, Johnson Controls

► Introduction

Variable speed drives (VSDs) can cut a chiller's annual energy use by up to 30 percent while maintaining operating reliability over a wide range of condition. This is accomplished in two ways:

- At part-load when cooling capacity can be reduced, a VSD chiller inherently uses less energy than a constant speed chiller whenever the compressor speed can be reduced to more closely match the load.
- At low-lift conditions, when either tower water temperatures can be reduced or chilled-water-supply temperatures can be increased, up to four times more energy can be saved if the VSD chiller is designed to operate in these off-design conditions.

Holding the Line on Operating Costs

Manufacturers are under continual pressure to control costs without affecting operations or worker comfort and safety. Because energy ranks as one of the largest operating expenses, improving energy efficiency of mechanical cooling systems is one of the best ways to reduce operating costs. In a typical water-cooled chiller plant, the chiller itself accounts for most of the energy consumption. That's why improving chiller efficiency is critical to controlling operating costs.

Even so, chillers rarely operate at their full-load efficiency rating, because conditions vary. Accordingly, the U.S. Environmental Protection

Agency (EPA) recommends installing VSDs on centrifugal chillers, because "this will allow the chiller to run at lower speeds under part-load conditions, thereby yielding a higher efficiency than is typically achieved by ordinary centrifugal chillers that control part-load operation with inlet vanes."

Using chillers with VSDs is a proven way to optimize energy utilization at full and part load, as well as under design and off-design conditions at varying ambient temperatures. In such cases, VSDs, also known as variable frequency drives (VFDs) or DC Inverters, can cut a chiller's annual energy costs by 30 percent or more.

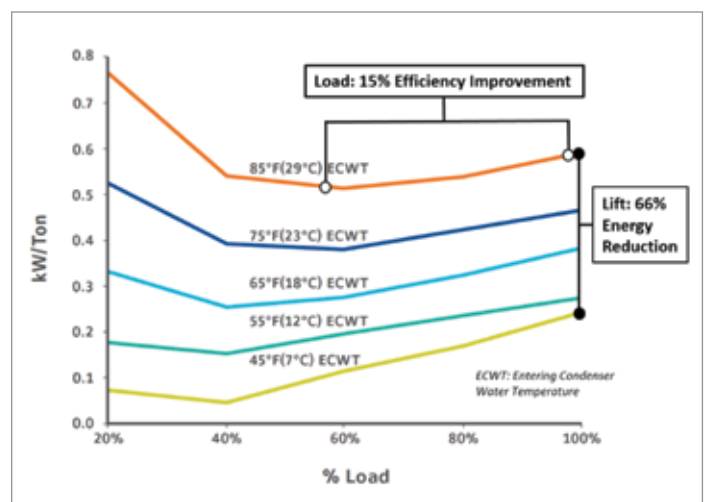


Figure 1: Real-world energy savings obtainable from load vs. lift

Because more energy is saved if a chiller can operate with reduced tower water temperatures compared to reduced capacity only, it's worth examining both scenarios closely.

Two Variables in Energy Savings

Of course, the cooling load (capacity) is a factor affecting chiller energy consumption. As shown in Figure 1, when a chiller at a constant entering condenser water temperature (ECWT) can reduce load (Btu/hr) by 50 percent, its efficiency (kW/ton) at the new condition improves by 15 percent.

The load reduction is possible, because the number of days when full capacity is required are few. According to the EPA, “Chillers spend most of their operating time at 40 to 70 percent load under conditions that are often considerably different from standard conditions.”

As the name indicates, VSDs can vary compressor motor speed to match capacity. Consequently, whenever a VSD can be slowed to match lower capacity requirements (and this may not always occur depending on the chiller operating profile), energy consumption can also be lowered.

This sharply contrasts with constant speed chillers, which typically accommodate less-than-full loads by closing their pre-rotation or inlet vanes to regulate the flow of refrigerant—which is like maintaining the speed of your car by pressing the gas pedal to the floor and controlling the speed with your other foot on the brake.

But the main factor that affects VSD chiller energy consumption is “lift.” Lift is defined as the difference between the evaporator pressure and condenser pressure.

The thermodynamics of lift has a profound impact on a chiller's energy consumption (Figure 1).

Chiller load is the amount of cooling the chiller provides, while lift determines how hard the chiller must work to deliver the cooling. The greater the difference between evaporator and condenser pressures, the greater the lift and the more work the compressor must perform. By reducing the lift, more energy savings can be realized.

Lower lift is an opportunity for significant energy savings. But these savings can only be achieved by chillers capable of taking advantage of low-lift conditions, such as using 55°F (12°C) or 45°F (7°C) tower water temperatures with full condenser water flow, which are 20°F (-7°C) or 30°F (-1°C) colder, respectively, than the 75°F (23°C) tower water typically allowed by traditional chillers.



The YORK® YK Centrifugal Chiller features a variable speed drive enabling energy consumption as low as .20 kW/TR (17.6 COP), reducing annual energy costs by as much as 30 percent.

Reducing Load and Lift Yields a Strong Return on Investment

When a VSD chiller can leverage the efficiencies obtainable when operating with reduced load and lift, the energy savings quickly recoup the additional investment in VSD technology.

In many installations, a VSD chiller that can take advantage of these off-design conditions can achieve a payback in less than a year or two—plus, the operating savings will continue for decades after the VSD has paid for itself.

Energy isn't the only source of savings from chillers with VSDs. Variable speed drives also drastically reduce the electrical inrush when chiller motors start up. Without a VSD, a typical chiller motor can experience an inrush of as much as 650 percent of full-load amps, causing tremendous heat buildup and flexing in motor windings.

Over time, heat damages the winding insulation and causes motor failure. That means higher repair and/or replacement bills and expensive downtime. With a VSD, a chiller starts more slowly and never draws more than 100 percent of full-load amps—and often far less. Less amperage means the backup generator can be smaller than would be needed for a constant speed chiller, cutting first cost. It also means less heat and less wear and tear on the motor, which reduces electrical shorts and motor burnouts to minimize maintenance costs and potential downtime.

What's more, if a VSD chiller loses power while it is operating, it can be restarted in just a few minutes. By contrast, a constant speed chiller can require 30 minutes to cool down and be restarted.

VSD CHILLERS DELIVER ENERGY SAVINGS UNDER REAL WORLD OPERATION

VSDs also boost a chiller's power factor—the measure of how effectively a system uses electricity. Chillers with VSDs often can sustain power factors of 0.95 or more, compared to power factors as low as .6 with constant speed chillers. A VSD can help avoid added charges imposed by some utilities when a facility's power factor falls below their threshold.

A high power factor also can eliminate the need for a power-factor-correction capacitor. Among other functions, capacitors correct for low power factors. Eliminating capacitors reduces cost and saves space in the mechanical plant.

It's also worth noting that the slower speed of VSD chiller motors means less noise. This reduces and can possibly eliminate the cost of sound-attenuating equipment, as well as enhances worker comfort.

Using VSD Chillers in Process Applications

The capabilities of YORK chillers with VSDs often make them suited for challenging applications that other chillers can't handle. When it was time for Sierra Nevada Brewing Co. to replace aging, maintenance-intensive chillers in its brewing process, energy efficiency was high on its priority list. The brewer wanted chillers that would run efficiently at part load. But it also needed chillers that could produce very low chilled water temperatures.

To meet both needs, Sierra Nevada installed four 235-ton York YMC² magnetic centrifugal chillers with VSDs. "One of the advantages with the York YMC² chillers is that they can maintain high efficiency at partial loads," says Brandon Smith, project engineer with Sierra Nevada.

"Other systems could not use such low temperatures at partial loads, while still maintaining efficiencies," says Smith.

The upshot? The new chiller plant saves 1.2 million kilowatt hours of energy each year, and requires significantly less maintenance. "We are

saving energy and staff time, increasing efficiencies, eliminating noise pollution, and reducing our impact on the local grid," says Cheri Chastain, sustainability manager.

Futuristic Chiller Efficiency is Available Today

Today, all chillers are more efficient than in years past. It is not uncommon to find older fixed-speed centrifugal chillers consuming about 0.60 kW per ton of cooling. VSD chillers can deliver substantially superior efficiency.

Constant speed chillers are designed for efficiency at design full load and design entering-condenser-water temperature. In the real world, chillers rarely operate under those conditions. Under low-load and low-lift conditions, YORK VSD magnetic-bearing chillers can operate at 0.10 kW per ton and lower.

Furthermore, advanced VSD chillers are designed to produce the low-harmonics recommended for today's electrical grid. Solid-state electronic devices, like VSDs, generate frequencies that affect the power system. YORK has been at the forefront of limiting harmonics to comply with utility grid, microgrid and manufacturing-plant requirements.

From reducing your plants carbon footprint, to delivering a cleaner, healthier working environment and cutting energy costs, YORK VSD chillers are designed to meet the most pressing concerns of manufacturers—energy, sustainability, sound, and uptime. **BP**

For more information contact Fred Berry, Chiller Channel Manager East Region, Chiller Solutions, Building Technologies & Solutions, Johnson Controls at email: John.F.Berry-EXT@jci.com or visit <http://connect.johnsoncontrols.com/YORK-variable-speed-drives>

To read similar **Chiller Technology** articles visit
www.coolingbestpractices.com/technology/chillers



"One of the advantages with the York YMC² chillers is that they can maintain high efficiency at partial loads. Other systems could not use such low temperatures at partial loads, while still maintaining efficiencies."

— Brandon Smith, project engineer with Sierra Nevada

COMPRESSED AIR
BEST PRACTICES
airbestpractices.com

FREE SUBSCRIPTION

DIGITAL EDITION FREE WORLDWIDE | PRINT EDITION FREE TO U.S. SUBSCRIBERS



**Learn How To Save Energy & Improve
Productivity In YOUR Industry!**

Subscribe at **airbestpractices.com**

Subscribe Now!





Adiabatic Cooling Keeps Pace with Growing **DATA CENTER HEAT DENSITY**

By Adam Meyer, Sales Manager, Technical Systems, Inc.

► Every year, the amount of electronic data that companies process and store grows exponentially. Data centers cannot economically increase the physical space available to keep pace with the growth, and are now challenged to provide more computer power in the same amount of space. The higher levels of microprocessing power in the same physical footprint increases heat density, so owners need more efficient cooling systems that will keep up with the market need without

breaking the bank. One technology receiving attention is adiabatic cooling, which uses up to 90 percent less water than other systems. One example is APEX technology, packaged mechanical cooling equipment developed by Technical Systems, Inc.

Data Center Cooling Challenges

The demand for advanced computing power rises year after year, but the more powerful the system, the more heat it generates. As data

centers grow, they place higher demands on cooling equipment. Packing as much kilowatt and computer usage into as small a space as possible is key to reducing the cost and size of the facility. In doing this, data centers increase the power density of their systems, drawing more power, and generating more heat per unit area.

In addition to increasing power costs, owners are concerned about the environmental

impacts of data centers, including their carbon footprint and their impact on local power plants and water usage. While power costs and water availability may vary from region to region, owners throughout the country are concerned about reducing operating expenditures and finding ways to transfer electronic data more efficiently, and with less electrical power and water than was used 10 years ago.

To make sure these powerful systems are in top shape and not overheating, cooling systems have to adapt and grow as well. To keep the business profitable, data centers must balance the benefits of advanced, powerful technology against the cost of running such computing systems. It has become clear that the industry can no longer go on the way it has for decades – constantly building larger and larger data centers as the need grows. They must find ways to remove heat efficiently without adding significantly to the already high cost of running the data center.

High Efficiency Adiabatic Cooling

All cooling equipment must reject heat to the atmosphere and most designers use either evaporative or air-cooling. Equipment using evaporative coolers (cooling towers) are more energy efficient than air cooled, but they use high volumes of water and require costly maintenance and chemical treatment. A data center can easily use many millions of gallons of water each year.

Air-cooled equipment operates well when ambient temperatures are cold, but they draw much more energy during hot seasons. This higher energy draw requires a larger and much more expensive infrastructure to support it. For example, backup generators must be sized for

the highest possible draw, and are thus much larger for air-cooled systems.

Recently, new technology has become available that uses a third option, adiabatic cooling, which incorporates both evaporative and air-cooling into a single system. Adiabatic cooling systems use evaporation of water to pre-cool the ambient air to within a few degrees of the wet bulb, allowing much cooler and more efficient operation.

Unlike purely traditional cooling towers that constantly use water, the adiabatic system uses evaporative cooling only during the hottest part of the day and year. Air-cooling only loses efficiency under unusually high ambient temperatures, so these are the only times evaporative cooling is truly necessary. During the rest of the time the system meets the facility's cooling load without using any water, operating as a simple air-cooling system.

These systems can run dry for as much as 85 percent of the year in most climates, with up to 90 percent less annual water usage

than other systems. When the ambient air is hot enough to require evaporative cooling, the system switches over, efficiently handling cooling needs for the whole year. When the ambient air is no longer hot, evaporation is no longer needed and the system can transition to dry air-cooling without water. A system set up in this way allows data centers to efficiently cool their processors while using much less water than traditional cooling systems.

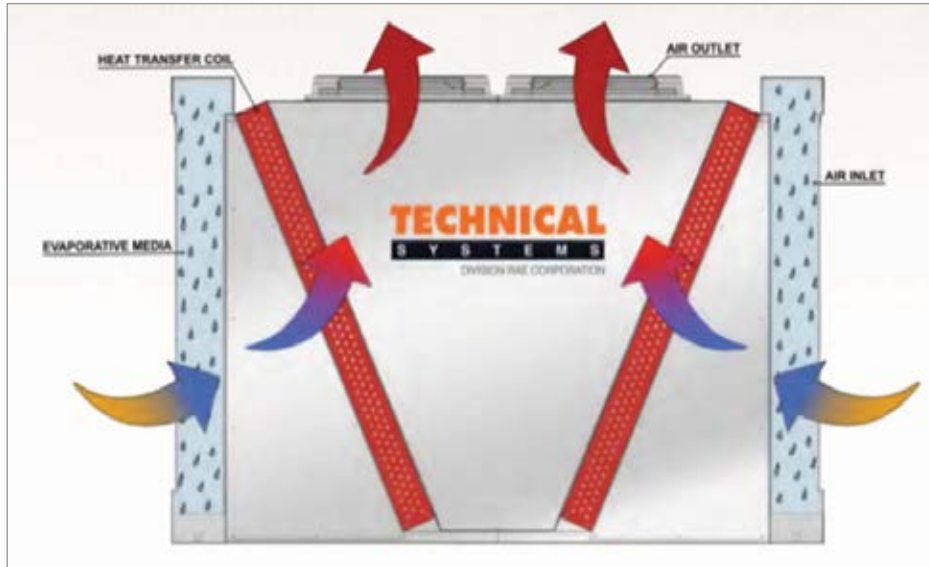
Evaporation is constrained within the adiabatic section, so the heat transfer coil remains completely dry, preventing unwanted scale buildup and reducing reliance on expensive chemical treatment systems.

Adiabatic systems consume far less energy than air-cooled systems. These smaller kilowatt systems can in turn reduce the size of costly backup generators that supports the cooling system. This reduction in infrastructure costs reduces the cost of building the facility and also reduces the power and utility bills. In addition, it also saves space, which can be



The TSI adiabatic APEX technology can be applied to fluid coolers, condensers, condensing units, and chillers.

ADIABATIC COOLING KEEPS PACE WITH GROWING DATA CENTER HEAT DENSITY



TSI's adiabatic APEX cooler combines both evaporative and air cooling as necessary.

used for the data centers' electronics when there are footprint issues.

New Options Offer Best of Both Worlds

Adiabatic technology has been used for many years in the data center industry on the air side for air handlers, but until recently it had not been adapted into mechanical equipment. Now, using its APEX technology, Technical Systems, Inc. has brought this versatile adiabatic cooling technology into economical self-contained mechanical cooling equipment.

The packaged unit contains factory built-to-order equipment with everything required

for operations. When it arrives in the field, the system is factory-tested and ready to go, with all components supplied from one single manufacturer. The technology can be applied to fluid coolers, condensers, condensing units, and chillers.

The Economic Solution

Challenged to do more with less, data centers are seeking innovative ways to keep operating costs as low as possible – all while computer technologies may be changing as often as every three months. In a market demanding denser and more powerful electronics, data centers are pressed for cooling technology that

can keep up with the times. New offerings in mechanical equipment, including packaged adiabatic cooling technology, helps data center owners meet the challenges posed by rising utility costs and environmental issues.

Adiabatic cooling brings together the best aspects of the most commonly used cooling systems. Packaged into one convenient unit, systems like the APEX help data centers efficiently cool their electronics while minimizing their cost of doing business.

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 about the high-quality, made-in-the-USA cooling and refrigeration systems manufactured by all four of the company's divisions, visit www.RAECorp.com **BP**

To read similar **Water Savings** articles visit www.coolingbestpractices.com/system-assessments/water-savings



“Adiabatic systems consume far less energy than air-cooled systems. These smaller kilowatt systems can in turn reduce the size of costly backup generators that supports the cooling system.”

— Adam Meyer, Sales Manager, Technical Systems, Inc.



INDUSTRIAL COOLING SYSTEM INDUSTRY NEWS

SPX Cooling Technologies Announces Expansion of Gearbox Repair Capabilities

SPX Cooling Technologies, Inc., a full-line, full-service industry leader in the design and manufacture of evaporative and air-cooled heat exchangers, announced they are expanding their gearbox repair capabilities and Marley Geareducer® Solutions program. SPX now provides repair and rebuild services for Amarillo cooling tower fan drives as well as for Marley Geareducers.

SPX has set the standard for cooling tower gearbox performance and durability for over 80 years. They produce gear drives with lower sound, longer life, and lower bearing maintenance costs compared to other manufacturers. The Marley Geareducer was designed by SPX engineers to optimize the entire system, ensuring all components work together to deliver excellent thermal performance.



SPX now provides repair and rebuild services for Amarillo cooling tower fan drives as well as for Marley Geareducers.

This expertise is now being used to provide reliable repair and rebuild services for both Marley and Amarillo brand gear drives. Factory-trained technicians with years of experience repair the gearboxes at the SPX Cooling Technologies plant in Olathe, KS. Every gearbox goes through a “run-in” procedure to simulate operating capacity before leaving the factory. Both inbound and outbound freight are covered by SPX and the units are returned with a one-year warranty.

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, visit: <http://spxcooling.com/featured/geareducer-solutions>

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

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 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.

About Aggreko

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.

For more information, visit <http://www.aggreko.com>

Aggreko and DuPont Bring Temperature Control to Sulfuric Alkylation Market

Power generation and HVAC specialty rental company, Aggreko plc, and the leading sulfuric acid alkylation technology licensor, DuPont, have teamed up to provide Aggreko temperature control, including chiller systems, to DuPont™ STRATCO® sulfuric acid alkylation customers worldwide.

Chiller systems are used in two key areas within the alkylation process to control process temperature: the reaction zone and the refrigeration section. The ability to reduce temperatures in these areas allows for significant process benefits in the form of increased throughput, reduced acid consumption, reduced corrosion and/or improved alkylate quality. Refineries use the alkylation process to convert low value mixed butylene, propylene and/or amylene feed streams into a high value alkylate product.

Aggreko's Process Services (APS) group and the DuPont Clean Technologies division conducted an East Coast refinery test where chiller systems were installed in the reactor feed section of the STRATCO alkylation unit. Initial test results demonstrated an increase in alkylate production of over 45%, going from an alkylate product yield of 6,800 bpd at a 63°F reactor operating temperature to a production rate of 9,900 bpd at 60°F and a decreased feed temperature from 57°F to 42°F.

The successful test led to an arrangement between Aggreko and DuPont to further explore and expand temperature control for the sulfuric acid alkylation market.

"Aggreko is a leading provider of temperature control systems for the petrochemical and refining industry," said Mark Puett, global business segment leader of DuPont Clean Technologies. "By partnering with Aggreko, we will ensure that the STRATCO alkylation units licensed by DuPont operate under optimal conditions in refineries."

Russell Schuster, senior vice president of temperature control for Aggreko commented, "We are proud to work with DuPont Clean Technologies and provide customers with temperature control that allows the STRATCO alkylation unit to run at reduced temperatures, thereby increasing process output."

Aggreko's APS group is the rental equipment industry's only specialized, rapid response team of elite, licensed process engineers that provides customized solutions for turnaround, emergency, process improvement or debottlenecking purposes. The group supports Aggreko's petrochemical and refining division, which has been providing rental equipment to the industry for more than 25 years.

About Aggreko

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.

About DuPont

DuPont (NYSE: DD) has been bringing world-class science and engineering to the global marketplace in the form of innovative products, materials and services since 1802. The company believes that by collaborating with customers, governments, NGOs and thought



"Aggreko is a leading provider of temperature control systems for the petrochemical and refining industry. By partnering with Aggreko, we will ensure that the STRATCO alkylation units licensed by DuPont operate under optimal conditions in refineries."

— Mark Puett, global business segment leader of DuPont Clean Technologies

CHILLER & COOLING BEST PRACTICES

coolingbestpractices.com

FREE SUBSCRIPTION

DIGITAL EDITION FREE WORLDWIDE | PRINT EDITION FREE TO U.S. SUBSCRIBERS



EXPERTS PROVIDE BEST PRACTICE ADVICE

Cooling Towers • Central Plant Chillers • Cooling System Components

Sustainable Energy & Water Savings with Chiller & Cooling Best Practices

Chiller & Cooling Best Practices is a technical magazine dedicated to discovering Energy and Water Savings in industrial chiller and cooling systems. Our editorial focus is on case studies and technical articles where application and system knowledge drives technology selection, creating energy savings in projects delivering excellent ROI's.

"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)

From Chillers, Dry Coolers and Cooling Towers to Hydronic Specialties and Master Controls

Our readers embrace Sustainability as a profitable business opportunity. We believe the industrial process cooling and HVAC installed base to be at a tipping point — one where "energy and water retrofits" will fuel a new era of market growth, similar to what we've seen in the compressed air industry. Better applying more varied cooling technology combinations to better understood partial-load demand profiles will fuel system improvements. This will combine with optimizing system components and using master controllers to further improve efficiencies.

To subscribe visit coolingbestpractices.com

Subscribe Now!



INDUSTRIAL COOLING SYSTEM INDUSTRY NEWS

leaders we can help find solutions to such global challenges as providing enough healthy food for people everywhere, decreasing dependence on fossil fuels, and protecting life and the environment.

The DuPont Clean Technologies division applies real-world experience, history of innovation, problem-solving success, and strong brands to help organizations operate safely and with the highest level of performance, reliability, energy efficiency and environmental integrity. The DuPont Oval Logo, DuPont™ and all products denoted with ® or ™ are registered trademarks or trademarks of E.I. du Pont de Nemours and Company or its affiliates.

For additional information about DuPont, please visit <http://www.dupont.com>.

ASHRAE Revises Energy Auditor Certification to Meet DOE Guidelines

ASHRAE announced revised requirements for its energy auditor certification, Building Energy Assessment Professional (BEAP). The revised requirements, which will take effect Thursday, March 16, 2017, will provide earners with recognition by United States government agencies for contracts requiring energy audit services.

“This update will not only help ensure the continued validity and relevance of ASHRAE’s energy auditor certification but also add value,” says ASHRAE President Tim Wentz, who holds an ASHRAE high-performance building design certification. “DOE recognition of ASHRAE’s Building Energy Assessment Professional (BEAP) certification will help ensure quality services are provided by these professionals as well as increase consumer confidence in the service provided and ultimately ensure the quality and performance of buildings.”

ASHRAE’s revised energy auditor certification program will validate competency against the Better Buildings Workforce Guidelines

scheme requirements for the Building Energy Auditor set forth by the National Institute of Building Sciences (NIBS) Commercial Workforce Credentialing Council (CWCC). The goal of this adjustment is to achieve U.S. Department of Energy (DOE) recognition by the summer of 2017 of services provided by these certificants.

Current ASHRAE BEAP certifications will renew against these new scheme requirements beginning in 2018.

ASHRAE had a role in developing the Guidelines through its participation on the Board of Advisors for the NIBS’ CWCC. The CWCC works to establish voluntary national guidelines to improve the quality and consistency of commercial building workforce credentials.

The purpose of the Better Buildings Workforce Guidelines is to reduce the confusion and uncertainty around workforce credentialing and lower costs as well as supporting better credentials, better workers and better buildings. The Guidelines set an industry-validated Job Task Analysis (JTA) for each of four, key energy-related jobs, building energy auditor, building commissioning professional, building operations professional and energy manager, as certification schemes and learning objectives for training programs.

About ASHRAE

ASHRAE, founded in 1894, is a global society advancing human well-being through sustainable technology for the built environment. The Society and its more than 55,000 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.



“DOE recognition of ASHRAE’s Building Energy Assessment Professional (BEAP) certification will help ensure quality services are provided by these professionals as well as increase consumer confidence in the service provided and ultimately ensure the quality and performance of buildings.”

— ASHRAE President Tim Wentz

INDUSTRIAL COOLING SYSTEM INDUSTRY NEWS



Leaders from the City of Birmingham and Trane came together, in late 2016, at the Titusville Public Library (pictured above) to launch energy saving upgrades to 125 city owned and operated buildings. The Titusville Public Library is one of 18 libraries in Birmingham that will receive upgrades to assist city facilities teams with managing and operating efficient and sustainable buildings, helping the city better serve the community.

“The energy upgrades these 125 city buildings will undergo are truly needed by the community,” said William A. Bell, Birmingham Mayor. “We are pleased that we will fund the improvements using future energy and operational savings at no additional cost to taxpayers.” The improvements are funded with a performance contract, which is a project delivery method that provides measurable business results to support strategic business objectives.

During the event, Mayor Bell and Jason Bingham, vice president of energy services and controls at Trane, signed a pledge formalizing the city’s commitment to sustainability and energy efficiency and officially launching the upgrade project.

“The City of Birmingham provides a real-life example of how governments can partner to deliver best-in-class operations and dramatic energy cost reductions,” said Bingham.

At the project outset, before identifying energy conservation measures, city leaders directed completion of an energy audit of all city owned and occupied buildings, which identified opportunities to increase energy efficiency and cut utility costs across 125 buildings.

The selected facility improvements are designed to assist city facilities teams with managing and operating efficient and sustainable buildings

Birmingham Deploys Trane Energy Saving Upgrades

In partnership with Trane, the city of Birmingham, Alabama, formalized its commitment to sustainability and launched energy saving upgrades to 125 city buildings at an event at Titusville Public Library. Trane is a leading global provider of indoor comfort solutions and services and a brand of Ingersoll Rand.

Slated for completion in 2018, the \$61.3 million project is expected to cut annual energy and operational costs by more than 30 percent, saving more than \$100 million over the next two decades.

that help the city better serve the community. The updated buildings will provide a more comfortable environment for visitors and other occupants and a more productive and healthy working environment.

Energy conservation measures will include water upgrades in 119 buildings; lighting upgrades in 117 buildings; energy and heating, ventilation and air conditioning (HVAC) controls for 108 buildings; building envelope improvements in 59 buildings; HVAC/mechanical upgrades in 45 buildings; roof replacements in 31 buildings; and transformer upgrades for 12 buildings.

The updated city, police departments, fire departments, museums, libraries, parks and recreation centers and buildings will provide more comfortable environments for visitors and other occupants to deliver more productive and healthy working environments.

The City of Birmingham project partnership includes a workforce development program in which Trane will work with Lawson State Community College and the Birmingham Construction Industry Authority on a professional development job-training program for Minority Business Enterprise contracting partners. The program focuses on expanding participants’ skills and expertise to help achieve the energy savings for this and future projects.

The partnership also will provide Birmingham city schools’ students with science, technology, engineering and mathematics educational opportunities to prepare for future “green” careers.



Leaders from Trane and the City of Birmingham gathered on Oct. 5 to launch upgrades to 125 buildings and sign the city’s commitment to sustainability. Shown here at the event are (from left) Dr. Darryl A. Lee, Executive Chief of Staff for District 3; Jason Bingham, vice president for energy services and controls at Trane; Carla Parker, strategic account executive for Trane; Birmingham Mayor William A. Bell; Rick Carson, account manager at Trane; and Mark Schnetzka, energy services contracting manager at Trane.

Enhancing Environmental Stewardship

In addition to the commitment to sustainability to be completed at the signing ceremony, the city also is dedicated to environmental stewardship as part of its master plan developed for the city. Through the Birmingham Green Commission, the city also has pledged to reduce CO₂ levels by 60 percent by 2027, as compared to 1990 levels.

About Ingersoll Rand and Trane

Ingersoll Rand 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.

About the City of Birmingham, Alabama

The City of Birmingham, Alabama, is the largest city in the state with a population currently estimated at 212,237, and a metro population of 1,136,650. Today, Birmingham has transformed itself into a medical research, banking and service-based economy, making it one of the nation's most livable cities with a vibrant downtown, a burgeoning loft community, a world-class culinary scene and more green space per capita than any other city in the nation.

For more information, visit www.ingersollrand.com or www.trane.com.

For more information about Birmingham, Alabama, visit www.birminghamal.gov.

Danfoss Names Vice President of Heat Exchanger Business

Danfoss, a leading manufacturer of high-efficiency components and controls for air-conditioning, heating, refrigeration, industrial, and water systems, recently named Lars Rasmussen as vice president of its heat exchangers business.



Lars Rasmussen, Vice President of Heat Exchangers, Danfoss

In this role, Rasmussen will focus on continuing to grow and develop Danfoss' heat exchanger product portfolio, research and development efforts, and on contributing to the growth of heat exchangers for refrigeration and air-conditioning applications worldwide.

“As a key component in our comprehensive portfolio of HVAC system solutions, Danfoss is continuing to invest in the development of heat exchanger

technology and in the support of our customers in the US and around the world,” said Rasmussen. “Today our portfolio includes brazed plate, micro plate, and microchannel heat exchangers, but we are now also investing in the development of microchannel evaporators that will improve heat transfer, reduce air pressure drop and refrigerant charge, and eliminate formicary corrosion.”

“We are dedicated to ensuring we have the right technical capabilities on board to best support our customers—and are very excited to soon open our new Application Development Center in Tallahassee, Florida, where we will work with equipment manufacturers to test and optimize technology to meet the performance and efficiency challenges of the future.”

Prior to joining Danfoss, Lars Rasmussen was general manager of the industrial solutions sector of Moog, a designer, manufacturer, and integrator of precision control components and solutions for military

“As a key component in our comprehensive portfolio of HVAC system solutions, Danfoss is continuing to invest in the development of heat exchanger technology and in the support of our customers in the US and around the world.”

— Lars Rasmussen, Vice President of Heat Exchangers, Danfoss



INDUSTRIAL COOLING SYSTEM INDUSTRY NEWS

and commercial aircraft, satellites and space vehicles, launch vehicles, missiles, automated industrial machinery, wind turbines, marine and medical equipment. He holds a master's degree in electrical engineering from the Technical University of Denmark as well as an Executive MBA from Ivey Business School.

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.

Institute of Refrigeration Honors Thomas Watson

Thomas Watson has been presented with the Institute of Refrigeration's J & E Hall Gold Medal in recognition of his groundbreaking work to improve the efficiency of chillers and industrial heat pumps. This included the introduction of large capacity oil-free magnetic bearing compressors, the first centrifugal chiller with zero-ozone depleting potential and the safe application of low GWP flammable refrigerants.

Mr. Watson was presented with the Gold Medal at the IOR Annual Dinner in London. He said he was surprised and delighted to receive

the prestigious award: "It was overwhelming. I really didn't expect it. For anything you do, you depend on your co-workers, your family, supervisors and people that help you. This is not just for me. To be singled out is a tremendous honour and sometimes I don't feel worthy because of all the things people have done before that I have built on."

The 72-year-old father of two started his career in the heating, ventilating, air-conditioning and refrigeration industry 45 years ago. He was a key contributor in the development of dual compressor centrifugal chillers. The benefits of this technology are energy saving and low installation costs. United States patent number 4,248,054 was issued to Mr. Watson for the multiple compressor load balancing control used with dual compressor centrifugal chillers.

A major contribution by Mr. Watson was the development of the Templifier® industrial heat pump. He was the lead engineer working with the Westinghouse Electric Research and Development Centre on this innovative technology. This product is used to provide high-temperature hot water recovered from numerous sources such as heat normally rejected by cooling towers and condensers for process cooling.

A typical application for the heat pump is in food processing plants which use waste heat from the refrigeration condensers to produce high temperature water for other processes. The high heating COP (Coefficient of Performance) is an economical means to reduce the use of energy from fossil fuels.

Mr. Watson was a member of the Project Monitoring Sub-Committee for ASHRAE Research Project 1308-TRP, *Identification and Evaluation of Working Fluids for High Temperature Heat Applications* (Including



Mr. Watson receiving the J & E Hall Gold Medal from IOR President Steve Gill. On the left is J & E Hall Managing Director Mark Roberts.



Thomas Watson (left) with an early centrifugal chiller.

Replacements for R-114). He co-authored the paper *Technical Problems in the Development of High Temperature Heat Pumps*.

He is deeply involved with developing heat pump technology using zero ozone depleting refrigerants that have low direct global warming potential. The working fluids being studied include HFO technology as it applies to larger compression and heat exchangers. Mr. Watson was the team leader for the development of the first production non-ozone depleting HFC-134a centrifugal chiller.

A major contribution to R-134a chiller technology was the test and development of pentaerythritol ester lubricants that have excellent oil return characteristics. Mr. Watson was the principal author of a 1993 paper *Refrigerant-134a Compatibility with Centrifugal Chillers*. This documented the major technical issues involved with centrifugal chiller design and application when a refrigerant of a different fundamental chemical structure is used.

He was the leader of the engineering development team for the first R-410A screw compressor chiller in the industry. By using HFC-410A as an alternative to HCFC-22, a non-ozone depleting refrigerant solution was produced 15 years ahead of the Montreal Protocol phase out. This development provided enabling technology to accelerate the introduction of R-410A.

A key feature of this product was high-energy efficiency and a low TEWI (Total Environmental Warming Impact). The chiller development was documented in a 1996 paper *A Comparison of R-22 and R-410A in Screw Water Chillers* that was presented at the International Symposium on HCFC Alternative Refrigerants in Japan.

Other significant contributions by Mr. Watson include being the engineering development team leader for the introduction of water chillers with active magnetic bearing direct-drive variable-speed centrifugal compressor technology. The chiller requires no lubricant which eliminates oil management issues and enables improved heat transfer.

Using the technical knowledge and practical experience gained during the transition away from high ODP CFC and HCFC refrigerants to HFCs, Mr. Watson is now heavily involved with the application of the new low GWP HFO and HCFO (hydrochlorofluoroolefin) refrigerants in water chiller and industrial heat pumps.

He is semi-retired and a consultant for Daikin Applied in Virginia. He recently chaired the ASHRAE standards project committee that published the first American National Standard on *Legionellosis: Risk Management for Building Water Systems*.

CHILLER & COOLING BEST PRACTICES

www.coolingbestpractices.com

ADVERTISER INDEX

Company	Page	Web Site
MTA USA	Outside Back Cover	www.mta-usa.com
Association of Energy Engineers	Inside Front Cover	www.globalcovevent.com
CTA North America	7	www.cta-na.com
Hydrothrift	9	www.hydrothrift.com
ISEL Lubricants	11	www.iselinc.com
Associated Air Balance Council	35	www.aabc.com

He is also chair of the *Air-conditioning, Heating and Refrigerating Technology Institute Research and Technology Flammable Refrigerants Sub-Committee*. This is conducting research into the safe application of flammable low global warming refrigerants. This international research programme also involves ASHRAE and the US Department of Energy.

Mr. Watson's love of technology stems from being taken to a railway station to see the steam trains every Sunday by his father from the age of two. He says: "Thermodynamics is my favorite subject. It is a job made in heaven for me and it has always been that way."

For more information visit www.ior.org.uk

Embraco Appoints New North America Director

Embraco, one of the largest manufacturers of hermetic compressors for refrigeration, announced that Pedro Pimentel Collier, former Project Director at Embraco, has been named the new North America Director.

INDUSTRIAL COOLING SYSTEM INDUSTRY NEWS

Collier has more than ten years of experience working in the refrigeration industry, and has led teams in different functions such as Procurement, Finance and Human Resources. Collier joined Embraco in 2013 as the Corporate Human Resources Senior Manager and was responsible for implementing related processes and strategies at a global level. He was later appointed to Project Director and has been responsible for leading cross functional teams from Procurement, Operations, R&D and Sales to achieve Embraco's objectives and implement major strategic initiatives for the organization.



Pedro Pimentel Collier has been named North America Director for Embraco.

Carlos Alberto Xavier, the previous director, was responsible for the startup of Embraco's operations in Mexico as well as for the general management of the region (USA & Mexico) for the past six years. He is now taking a new role at Embraco and will be involved with future strategic projects for the company.

This transition will be effective as of March 1st, 2017. As North America Director, Collier will continue to implement Embraco's core

mission to provide innovative solutions for a better quality of life and collaborate with employees in North America and around the world to develop cutting-edge and innovative solutions for Embraco's customers and end users.

"I am excited to start this new chapter at Embraco," said Collier. "In this new role I will continue to encourage collaboration among different areas of our company to better serve our customers by putting their needs first, anticipating market trends and providing forward-facing, high-efficiency solutions."

About Embraco

Headquartered in Joinville, Santa Catarina, Brazil, Embraco is a multinational manufacturer of hermetic compressors, the main component responsible for producing cold in refrigeration systems. With more than 12,000 employees and an annual production capacity of 39 million units, Embraco has emerged as a leader in highly innovative refrigeration technology. With offices and factories in China, Italy, Slovakia, Mexico, the United States and Russia, Embraco offers energy efficient refrigeration solutions to the global market.

To learn more about Embraco visit www.embraco.com and to learn more about the company's commitment to researching natural refrigerants visit www.naturalrefrigerants.info.

Contact Rod Smith for ad rates: rod@airbestpractices.com, Tel: 412-980-9901

CHILLER & COOLING BEST PRACTICES

www.coolingbestpractices.com

Advertising & Editorial **Rod Smith**
rod@airbestpractices.com
Tel: 412-980-9901

Subscriptions & Administration **Patricia Smith**
patricia@airbestpractices.com
Tel: 412-980-9902

A Publication of: **Smith Onandia Communications LLC**
37 McMurray Rd. Suite 106
Pittsburgh, PA 15241

Chiller & Cooling Best Practices is published quarterly and mailed together with Compressed Air Best Practices®. Compressed Air Best Practices is published monthly except January-February combined by Smith Onandia Communications LLC, 37 McMurray Rd. Suite 106, Pittsburgh, PA 15241. Periodicals postage paid at Pittsburgh, PA and additional mailing offices. POSTMASTER: Send address changes to: Compressed Air Best Practices, 37 McMurray Rd., suite 106, Pittsburgh, PA 15241.

Compressed Air Best Practices® is a trademark of Smith Onandia Communications, LLC. Publisher cannot be held liable for non-delivery due to circumstances beyond its control. No refunds. SUBSCRIPTIONS: Qualified reader subscriptions are accepted from compressed air professionals, plant managers, plant engineers, service and maintenance managers, operations managers, auditors, and energy engineers in manufacturing plants and engineering/consulting firms in the U.S. Contact Patricia Smith for subscription information at tel: 412-980-9902 or email: patricia@airbestpractices.com. REPRINTS: Reprints are available on a custom basis, contact Patricia Smith for a price quotation at Tel: 412-980-9902 or email: patricia@airbestpractices.com. All rights are reserved. The contents of this publication may not be reproduced in whole or in part without consent of Smith Onandia Communications LLC. Smith Onandia Communications LLC. does not assume and hereby disclaims any liability to any person for any loss or damage caused by errors or omissions in the material contained herein, regardless of whether such errors result from negligence, accident, or any other cause whatsoever. Printed in the U.S.A.



Enviro/Tech is a registered trademark.



7th Edition of the AABC National Standards *Now Available!*



Order your copy of the AABC National Standards for Total System Balance in hardcover, PDF, or convenient bundle option!

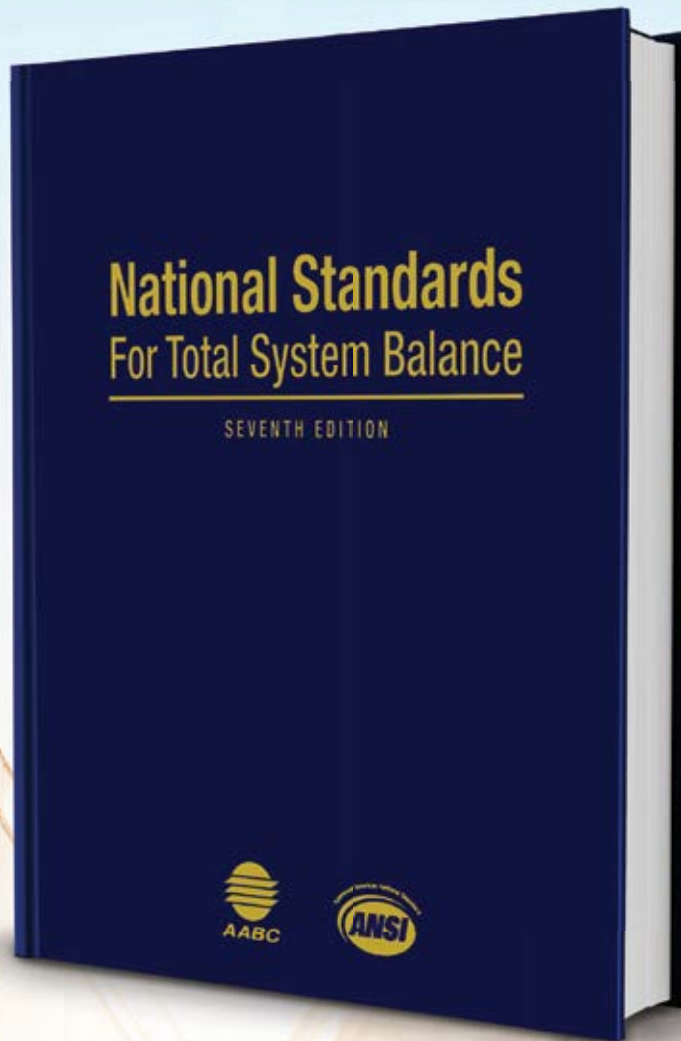
www.AABC.com/publications



A MUST-HAVE RESOURCE FOR HVAC ENGINEERS!

This comprehensive manual for the test and balance industry details the minimum standards for total system balance, assists design professionals in achieving design intent, provides a better understanding of the scope of work required of the TAB agency, and ensures that proper methods and procedures are followed in the test and balance process.

For the first time, this newest edition is American National Standards Institute (ANSI) approved.



New, additional and revised content includes:

- All-new sections on testing energy recovery systems and chilled beams
- Revised and updated content on constant volume air systems
- Revised recommendations for duct leakage testing
- Recommendations for air handling unit pressure testing including deflection testing
- New chapter on "Testing and Balancing Health Care Facilities"
- Updated testing tolerances for air, hydronic, pressure and temperature
- Expanded chapters on hydronic balancing and new chapter on domestic water balancing
- Recommendations for room, floor and building pressure testing
- Important updates to laboratory and kitchen systems.

Order the new edition of the AABC National Standards online at
www.AABC.com/publications



Associated Air Balance Council

1518 K Street, N.W., Suite 503
Washington, D.C. 20005 • 202-737-0202

From **MINI** to... **MIGHTY**



MTA INDUSTRIAL PACKAGED CHILLERS

Complete Cooling Solutions From 0.3 to 60 Tons

Whether you're cooling a single piece of equipment or a complete industrial process, the *TAEvo TECH* chillers from MTA have the capacity and reliability that you need and expect. All models are fully-featured with scroll compressors, high performance pumps, and our unique evaporator/tank design that permits higher flow rates with less fouling than brazed-plate alternatives. And the included controls allow an ambient-following set point function and remote monitoring as standard.

With over twenty different models in stock and ready for immediate shipment, your industrial cooling solution is closer than you may think.

Contact us today and let our experienced applications staff select the perfect model for your project.



MTA USA, LLC

25 John Glenn Drive Suite 104, Amherst NY 14228
Tel: +1 716 693 8651 | E-mail: info@mta-usa.com
www.mta-usa.com

MTA SpA Italy (Head Office & Manufacturing Plant)
info@mta-it.com | www.mta-it.com



Cooling, conditioning, purifying.