The Magazine for ENERGY EFFICIENCY and WATER CONSERVATION in Cooling Systems

CHILLER & COOLING BEST PRACTICES

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October 2018

Hospitals

COOLING SYSTEM OPTIMIZATION

COOLING TOWERS & CHILLERS

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COOLING SYSTEM OPTIMIZATION

COOLING TOWERS & CHILLERS

COLUMNS

*The cover image of this October 2018 Issue was provided compliments of the Penn State Health Milton S. Hershey Medical Center.

FROM THE EDITOR

Hospitals play a critical role in our society and chillers play a critical role in them, providing comfortable conditions for patients and medical professionals. Hospitals challenge engineering firms with specifications forced to include worse-case scenarios relating to disasters and also with redundancy requirements to provide 100% uptime assurance.

Our lead article is about an energy and resource efficiency project done at the Penn State Health Milton S. Hershey Medical Center in Hershey Pa. Led by Penn State Health Campus Energy Engineer, Kevin Kanoff, (who is a Certified Energy Manager), the project evolved around a software and analytics platform used to optimize three chiller plants in addition to various equipment upgrades, allowing them to save 4.16 GWh/yr in electrical energy consumption — and shave $300,000 off annual electrical costs.

HVAC systems are the largest customer of chillers in a hospital. Ian Dempster, from Optimum Energy, states "HVAC systems typically account for 44% of commercial buildings' energy consumption, HVAC optimization should be a priority efficiency upgrade after lighting improvements and other low-hanging fruit." I hope you enjoy his article about the barriers to HVAC system optimization and how to overcome them.

Rush University Medical Center (RUMC) is now Chicago's second-largest hospital with multi-story buildings that dominate the city's medical district. When two aging fixed-speed 300-ton water-cooled centrifugal chillers needed to be replaced, they thought they'd have to use cranes to install them. We have an excellent article about how Smardt split-shell chillers, with Danfoss Turbocor® compressors, were able to simply take an elevator up to the penthouse mechanical room, a solution that cut installation costs while boosting energy savings.

The NPE 2018 International Plastics Showcase was held at the Orange County Convention Center in Orlando, Florida. Setting all-time records, the Show attracted 2,180 exhibitors — including Chiller & Cooling Best Practices and Compressed Air Best Practices® Magazines! The plastics industry is the 4th largest in the U.S. It's a major user of all the technologies we cover including blowers, vacuum, chillers and compressed air system components. I hope you enjoy our Show Report.

We are announcing the 2019 Best Practices Expo & Conference, being held October 13-16, 2019 at the Nashville Music City Center. Please contact me for exhibitor/sponsor opportunities and find more information at www.cabpexpo.com

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

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RESOURCES FOR ENERGY ENGINEERS

CHILLER & COOLING TOWER TECHNOLOGY PICKS

SPX Cooling Technologies Launches Marley® MBX EZ Pack Fill for Service Contractors

SPX Cooling Technologies, Inc., a full-line, full-service industry leader in the design and manufacture of cooling towers and other specialized heat exchangers, introduces the Marley® MBX EZ Pack Fill, high-performing fill that provides easy handling and assembly for faster installations. Specifically designed for fill replacement projects, the polyvinyl chloride (PVC) pack fill delivers to the job site in two pieces and is bottom-supported.

MBX EZ Pack fill is available in various height dimensions and air travels (from 48-60 inches), stackable in modular towers, adaptable for various slope conditions, and easy for the contractor to store and cut to size. The steel bottom support that accompanies the MBX EZ Pack fill arrives unassembled for ease of handling. Hardware is not required to install the steel bottom support, and it includes retainers and air seals, allowing easy cleaning under the fill.

Thermoformed from inert PVC for long service life and minimal maintenance, the MBX EZ Pack fill incorporates highly efficient cellular drift eliminators, which are integrally molded into the fill sheets. These eliminators may reduce drift emissions from the tower by a factor of 10 or more. Louvers are also integrally molded within the fill sheets to help prevent water from escaping and ensure precise air distribution throughout wide variations in airflow.

The Marley® MBX EZ Pack Fill

MBX EZ Pack fill is easy for contractors to carry, stack and install in a cooling tower, and eliminates the need for structural supports. For more information, visit www.spxcooling.com.

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 95 years. SPX Cooling Technologies and its product brands are part of SPX Corporation. For more information, please visit www.spxcooling.com.

About SPX Corporation

SPX Corporation is a supplier of highly engineered products and technologies, holding leadership positions in the HVAC, detection and measurement, and engineered solutions markets. Based in Charlotte, North Carolina, SPX Corporation had approximately $1.5 billion in annual revenue in 2016 and more than 5,000 employees in about 15 countries. SPX Corporation is listed on the New York Stock Exchange under the ticker symbol "SPXC." For more information, please visit www.spx.com.

Delta T Systems Offers New Family of Industry 4.0 Ready Air and Water Chillers

A new line of air and water-cooled chillers brings precision temperature control and industry-leading energy savings to a wide variety of batch, process, rolling and molding applications.

Delta T Systems recently completed the design of a ground breaking line of variable speed chillers. The water and air cooled chillers are available from 1 to 30 tons and operate at a standard range of 0 ˚F to 80 ˚F (-18 ˚C to 27 ˚C). The well-proven technology in these units consumes 30-50% less energy than fixed speed models, and as a result offers a two to three year payback due to reduced operating costs. All portable chiller models offer state of the art, adaptive controls with remote communication options and are Industry 4.0 ready.

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Industry 4.0 is an emerging industry standard that envisions a tight integration of machines and controls that come together with remotely connected equipment and humans in a progressively seamless manner. Industry 4.0 systems will incorporate transparent communication protocols and machine learning algorithms that can collect and analyze production data to improve efficiency, reduce maintenance requirements, support human activity and decentralize decision making. These systems will be able to learn and control work cells and production lines with very little input from human operators.

Delta T Systems air and water cooled variable speed chiller units are not only equipped for Industry 4.0, they also come loaded with standard features that some companies charge extra for.

Delta T Systems, tel: 262.628.0331, *www.deltatsys.com*

Frigel BWR Water Recovery System for Adiabatic Coolers

Frigel, the pioneer in intelligent process cooling, has taken sustainability in process cooling to new heights with the introduction today of its Ecodry BWR Water Recovery System, which gives users of the Frigel Ecodry 3DK Closed-Loop Adiabatic Central Coolers the ability to capture and reuse more water than previously possible.

For decades – and in thousands of installations throughout the world – companies with an Ecodry system have experienced the ability to automatically reduce water consumption by as much as 95 percent when compared with an open cooling tower. Now, Ecodry users who equip the unit with the optional BWR Water Recovery System stand to gain an even higher level of water savings to achieve sustainability goals and save more costs. Visitors to NPE2018 in Orlando, Fla., May 7-11, are invited to see how it works by visiting Frigel at Booth W193.

An Ecodry BWR Water Recovery System gives users of the Ecodry 3DK Closed-Loop Adiabatic Central Cooler the ability to capture and reuse more water than previously possible.

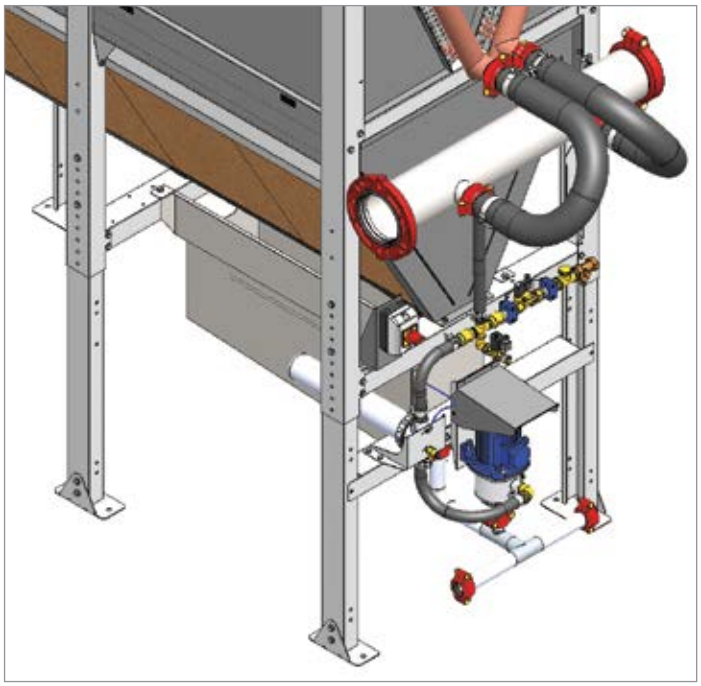
"Those who rely on process cooling water for production want to conserve resources because it's environmentally responsible and it reduces operational expenses," said Frigel North America Marketing Manager Al Fosco. "This latest innovation is another example of Frigel's multi-faceted Diamond Service advantage, which in this case means we've further advanced our unique Ecodry technology to help customers minimize water use and increase profitability. It also speaks to our scientific approach to process cooling since we design and configure each system to match to every customer's unique application and goals."

The Ecodry unit, which conserves water as a closed-loop system, features an internationally patented adiabatic chamber that uses a mist to cool process water circulated to it from processing machines. The Ecodry BWR Water Recovery System consists of small tanks, pumps and a drip pan located beneath the Ecodry unit. Controlled by Frigel's 3PR central control system, the system automatically catches unevaporated misting water and recycles it back into the adiabatic chamber for reuse, while simultaneously shutting off the city water supply. The system is ideal for use in unusually humid ambient conditions when small amounts of misting water can go unused. It can also be used with an Ecodry unit configured with an optional ABS Adiabatic Booster System, which uses extra water in the cooling coil chamber when needed to reach targeted process cooling water temperatures.

The BWR automatically discharges any unused water to drain when the adiabatic function is no longer required as ambient temperatures drop. So, there is never any standing water in the system. To learn more, visit www.frigel.com/npe.

About Frigel

Frigel has been a worldwide market leader in intelligent process cooling since the 1960s. Foremost among Frigel's products is Ecodry, a unique, internationally patented, closed-loop intelligent cooling system that has been proven at more than 5,500 manufacturing installations worldwide. Ecodry, an environmentally friendly cooling solution, keeps cooling water clean, delivers substantial savings on water, chemicals, energy and maintenance. Frigel also manufactures



The optional Ecodry BWR Water Recovery System is located beneath an Ecodry 3DK Closed-Loop Adiabatic Central Cooler shown here.

and markets the unique, cycle-time improving Microgel combination chiller/temperature control units (TCUs), as well as Turbogel and Thermogel TCUs, Aquagel pumping and filtration equipment and Heavygel central chillers. Visit www.frigel.com for more information.

EchoPod® Reflective-Ultrasonic™ Liquid Level Sensors Work in Condensation

Condensation is the most common variable in liquid level applications, and it substantially degrades the measurement signal strength of ultrasonic sensors, until now. New reflective-ultrasonic level sensors work in condensation. By orienting the transducer vertically, condensation runs off the unimpeded transducer face to deliver reliable level measurement. EchoPod reflective-ultrasonic level transmitters are offered in small and bulk tank versions with optional relay control, push button display or software configuration. For information, go to www.flowline.com/echopod

RESOURCES FOR ENERGY ENGINEERS

Victaulic Launches Most Economical Joining System for Small Diameter Carbon Steel Pipe in North America

Victaulic, the world's leading manufacturer of mechanical pipe joining systems, today announced the launch of its QuickVic™ SD Installation-Ready™ System, a plain end pipe joining technology designed for use on carbon steel HVAC systems sized 2"/DN50 and down.

The Victaulic *QuickVic* SD System is the most economical and efficient pipe joining solution for small diameter commercial and industrial HVAC applications. The product line offers a significant total installed cost savings when compared to current pipe materials and installation methods used, including copper press or sweat and carbon steel press or thread.

"As preferences for piping materials evolve, Victaulic is committed to offering its customers innovative solutions that reduce project costs, improve durability, and make installation and maintenance more efficient," said Scott Stewart, product manager at Victaulic. "The *QuickVic* SD System is our latest proof point of that commitment, offering our first mechanical pipe joining solution for HVAC customers making, or that have made, the transition to carbon steel piping for two inches in diameter and smaller."

Reduce Material Costs, Price Volatility and Project Risk

Copper tubing is often the pipe material of choice for small diameter HVAC systems, but it presents unique challenges for contractors grappling with higher prices and jobsite theft. With the *QuickVic* SD System, Victaulic customers can more confidently make their transition to carbon steel pipe, and as a result, reduce material costs, simplify project management, and reduce financial risk.

"Copper tubing costs can be up to 60 percent higher than carbon steel for small diameter HVAC jobs," said Stewart. "Our new *QuickVic* SD System enables customers to choose a more cost-conscious carbon steel material without sacrificing the speed of installation of copper systems."

Drive Installation and Maintenance Efficiencies

Contractors with a preference for copper tubing commonly sweat their joints, a time- and labor-intensive procedure that requires additional permits, such as hot work, which can lead to lengthy and costly installations. Pressing copper joints is a faster, cleaner alternative, but introduces expensive fittings and unique tools for installation that can add to the complexity of a project. Regardless of choice, both methods are permanent which means mistakes or modifications must be cut out, adding to costs and delays. Threading carbon steel is often preferred to avoid the limitations associated with sweating and pressing, but even it requires bulky, messy equipment that can clutter a jobsite.

Utilizing Victaulic's new *QuickVic* SD system on small diameter carbon steel systems eliminates these challenges and drives installation and maintenance efficiencies. The couplings and fittings are easily installed with common hand tools and feature no loose parts that can be dropped or lost. In a maintenance or retrofit situation, the joints can be disassembled and reinstalled as needed, without having to cut out and remove excess piping. The system also provides multiple visual inspection features, including bolt pad-to-bolt pad verification, a retainer inspection window, and knurled insertion depth markings on the pipe, to help ensure correct assembly throughout the installation process. Additionally, the products include Victaulic's patented "Leak-If-Not-Tightened" technology, which offers confidence to the contractor; the gasket is designed not to seal until the coupling or fitting is mechanically secured on the pipe during initial installation.

Victaulic's QuickVic™ SD Installation-Ready™ System is a plain end pipe joining technology designed for use on carbon steel HVAC systems sized 2"/DN50 and down.

"Installation times using the *QuickVic* SD System for carbon steel pipe are up to four times faster than traditional methods," said Stewart. "It's also the only system on the market that can be visually verified for correctness after installation."

Victaulic's QuickVic SD Installation-Ready System

The comprehensive line includes *Installation-Ready* couplings, fittings and valves, and the PC3110 Cut & Mark Tool. Available in sizes ½" to 2"/DN15 to DN50, the products can be used on Schedules 10 through 80 carbon steel pipe, with a maximum working pressure of 300 psi/2068 kPa/21 bar and up to 250 ˚F/120 ˚C (with the EPDM gasket).

The PC3110 Cut & Mark tool allows the user to simultaneously cut and mark Schedules 10 through 80 carbon steel pipe. It leaves two knurled markings on each piece to indicate the proper insertion depth for proper coupling/fitting installation. The first mark indicates the correct insertion depth for ½ - 1 ¼" sized products; the second for 1 ½ - 2" sized products.

"Contractors can now realize the speed of press systems along with the material savings of carbon steel pipe," added Stewart. "Whether you're considering a transition to carbon steel on your small diameter HVAC projects, or you've already made it, the *QuickVic* SD *Installation-Ready* System will help boost your project economics."

For more information about this Victaulic system solution, visit www.quickvicsd.com.

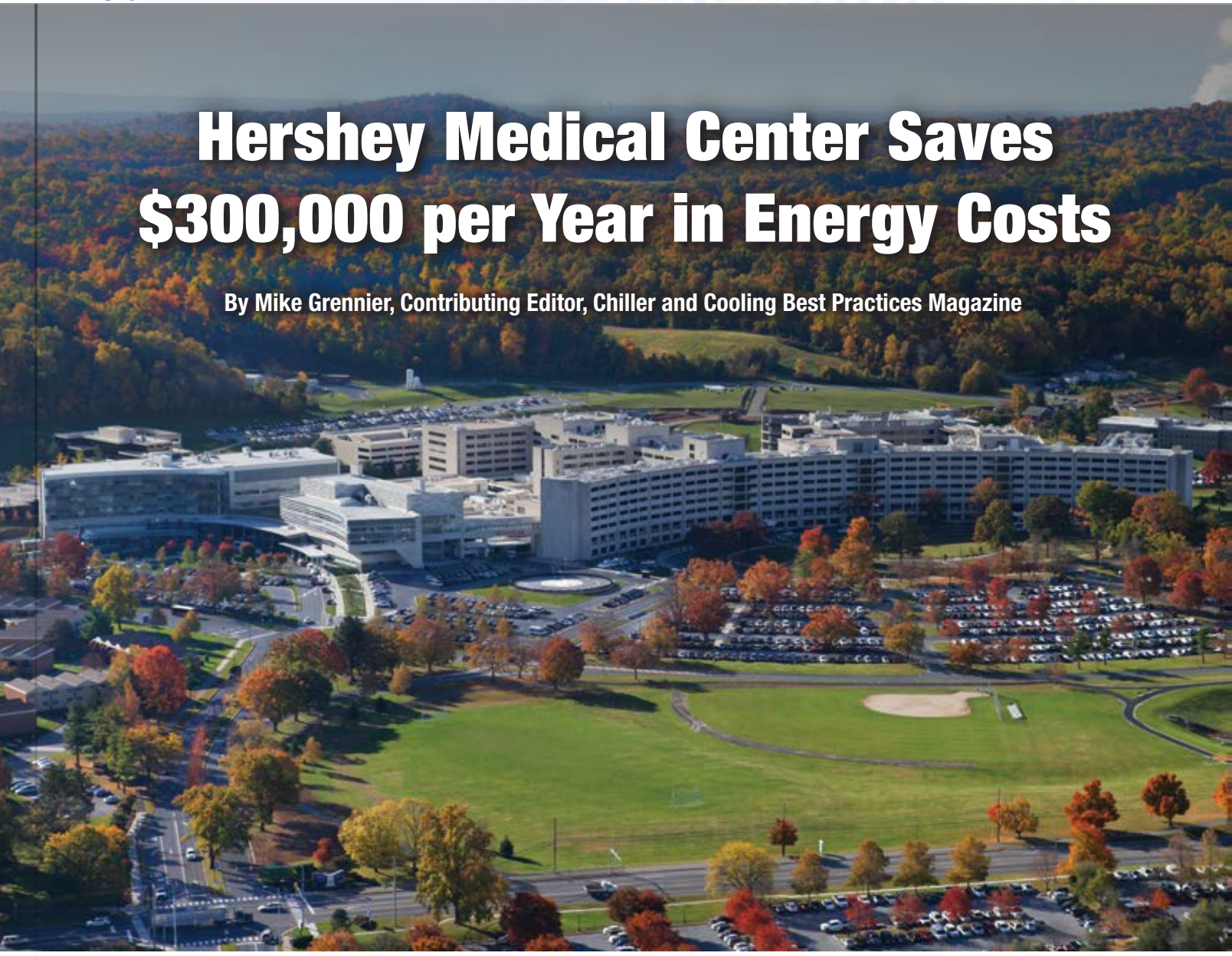
About Victaulic

Since 1919, Victaulic's pipe joining and flow control solutions have optimized construction productivity and reduced risk, ensuring projects are completed safely, on time and within budget. Driven by a spirit of continuous innovation, Victaulic's portfolio of 100,000+ products and patented technologies promote freedom of design, as well as simplified inspection and maintenance for the life of any system.

With more than 3,500 employees and 40 international facilities, Victaulic helps customers in over 120 countries succeed in the global construction industry. From the tallest buildings to the deepest mines, customers trust our products to increase overall system durability in the most demanding construction projects and operating conditions. Learn more about how our innovative piping products and design services can engineer confidence into your build at www.victaulic.com.

Hershey Medical Center Saves $300,000 per Year in Energy Costs

By Mike Grennier, Contributing Editor, Chiller and Cooling Best Practices Magazine



Penn State Health Milton S. Hershey Medical Center, Hershey Pa., is all about energy and resource efficiencies, which is why it adopted a new approach to managing its chilled water operation. The approach, which revolves around a software and analytics platform used to optimize three chiller plants in addition to various equipment upgrades, has allowed it to save 4.16 GWh/yr in electrical energy consumption — and shave $300,000 off of its annual electrical costs. With an incentive from the local utility of $415,799, the multi-phased initiative achieved a payback of 4.3 years.

The project also involved a shift from a constant-flow strategy to a variable-flow approach, resulting in a more streamlined and effective

"We're always looking at our energy use and it's very obvious that chilled water production is a major energy user."

— Penn State Health Campus Energy Engineer Kevin Kanoff, C.E.M.

method for delivering as much as 14,200 tons of chilled water to the sprawling campus, said Penn State Health Campus Energy Engineer Kevin Kanoff, C.E.M.

"We used to use stepped controls to managing the plant," Kanoff said. "But the optimization methodology now lets us run with more chillers and more pumps and do it more efficiently, which is a simpler and easier method of management and control. It really helps our operators better manage chilled water production."

Background

The Milton S. Hershey Medical Center (www.pennstatehealth.org) serves more than 1.2 million patients and employs 10,000 people. The campus includes two hospitals, five institutes, and Penn State College of Medicine. Annual energy consumption at Hershey Medical Center is approximately 112,000,000 kWh of electricity and 573,000 mmbtu of natural gas.

Three chiller plants serve 2.6 million square feet of air-conditioned building space. The chiller operations include a central plant that uses eight chillers and two satellite plants with two chillers each, all of which combine to provide a total of 14,200 tons of cooling. The system also includes a 1.4 million gallon chilled-water storage tank and four cooling towers. Chilled water production totals 24.8 million ton-hours. In all, 12 operators manage the chiller plants.

The chiller optimization project is one component of a multiphase energy efficiency program that began in 2009. By 2015, the energy efficiency program had reduced the campus' energy intensity by 20%. Yet Kanoff always knew more could be done to further improve the efficiencies of the chiller plants.

"We're always looking at our energy use and it's very obvious that chilled water production is a major energy user. We know our operators always do a good job and we have always had good operating strategies, but we had inklings there were good opportunities for improvement in energy efficiency," Kanoff said.

HERSHEY MEDICAL CENTER SAVES $300,000 PER YEAR IN ENERGY COSTS

Taking Chiller Plant Efficiencies to a New Level

With plans to address chilled water production in place, Kanoff launched the optimization project in multiple phases to take the efficiencies of the chiller plants to a new level.

During the first phase, Optimum Energy (www.optimumenergyco.com) performed an engineering site assessment that showed the medical center could gain additional energy savings. At that point, Johnson Controls – as Hershey Medical Center's lead vendor – installed Variable Speed Drives (VSDs) on the central plants' pumps and fans. Johnson Controls (www.johnsoncontrols.com) also added power meters and sensors to the equipment for precise measurement of all system components, and fully automated the plant.

Next, Optimum Energy installed its OptiCx™ platform, which seamlessly optimizes all aspects of enterprise-grade HVAC, including chilled water plants and air-handling systems. In all, Hershey Medical Center uses 155 air handlers.

Recognizing that security of data systems is a high priority for a medical facility, Optimum Energy worked closely with the center's IT staff to ensure all data going from the plant in Hershey to Optimum Energy's cloud-based platform would be absolutely secure.

Optimum Energy also combined the data analytics of the OptiCx solution with its OptimumLOOP™ relational control to optimize the plant holistically. It automatically stages all the chillers and the chilled-water storage tank as an integrated whole, choosing the best option based on equipment efficiency and demand for cooling. To do so, the software continuously collects data about plant operations, outside conditions, and hundreds of other parameters, and calculates how to operate for peak efficiency and operational stability. It then adjusts the set points of pumps, fans, and other components in real time.

"The system finds the sweet spots in operating efficiencies for the pumps, chillers, and towers, etc., and determines where the best efficiency is to meet that particular demand in gallons per minute at that moment in time," Kanoff said, adding that the system controls the entire operation with plant operators' oversight.

Optimum Energy completed the installation of its optimization and analytics platform in June 2016.

"The implementation at all three plants went smoothly, said Kanoff. "From a building environment perspective, the system went through start-up seamlessly. Critical patient areas were not compromised."

Plant Operators Adopt New Mindset

The optimization effort streamlined chiller operations that staff had performed manually without a complete picture of the system. The switch to a variable-flow approach and the

The Milton S. Hershey Medical Center's central chiller plant.

adoption of an automated system required a new mindset, said Kanoff.

"The team still monitors the chillers and verifies the data, but now they do it with OptimumLOOP," he said, noting the approach called for facility operators to gain familiarity with the new system.

"They had to watch the how the equipment performed and live with the system for a while to realize how the optimization strategy works to provide chilled water in an efficient way. Now, we're not managing things on the edge or our seats. Instead, our operators have better tools to manage chilled water production and can do it with less stress," Kanoff said.

Another element of the strategy included the replacement of two aging centrifugal chillers at the central chiller plant with magnetic-bearing centrifugal chillers, each of which is rated to deliver 1,000 tons of cooling. The new chillers were installed in the winter of 2017 in keeping with the operation's end-of-life equipment replacement program.

"The new chillers are now first on since they're most efficient for managing low flows," Kanoff said. "As demand for chilled water increases, the optimization system will add the next chiller and so on based on the operators' determination that it's the right way to go. It's now totally optimized but in a way we wanted with the operators having the final say in the decision process."

Results

The new approach exceeded expectations for energy savings and resource efficiencies.

Annual energy savings associated with the software platform and analytics solution were found to be almost 4.2 GWh/yr, roughly 1 GWh/yr more than expected, and campus

The medical center's central chiller plant leverages pumps with VSDs (center) to achieve energy efficiencies.

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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 average tape plant has plastic extruder motors and electric heated dyes as the largest energy consumers. Other consumers are chilled water (20%), compressed air (3%) and lighting (1%). We look at chiller set-points and try to maximize them for energy efficiency. At our Danville plant, we have a capacity of 5,000 tons of cooling managed by over fifteen chillers."

– Michael Jones, Corporate Energy Team Leader, Intertape Polymer Group

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 optimizing system components and using master controllers to further improve efficiencies.

"VSDs can cut a chiller's annual energy use by up to 30 percent while maintaining operating reliability."

– Fred Berry, Chiller Channel Manager, Johnson Controls ("VSD Chillers Deliver Energy Savings Under Real World Operation," May 2017 Issue)

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HERSHEY MEDICAL CENTER SAVES $300,000 PER YEAR IN ENERGY COSTS

Magnetic-bearing centrifugal chillers at the central chiller plant.

energy intensity dropped 4%. The results are in addition to the 20% reduction in energy intensity achieved earlier, bringing the campus-wide reduction to 24 percent over 2009 levels.

"We initially projected an energy savings of 3.4 GWh annually, but the electric utility's evaluator found that savings are actually 4.16 GWh annually," says Kanoff. That translates into electricity costs savings of about $300,000 a year; he originally projected that the system would save $261,000 a year. As a bonus, Hershey Medical Center earned a onetime $416,000 incentive from the utility.

Kanoff is also pleased with efficiencies of the chiller plants. Annual average plant-wide efficiency is now 0.646 kW/ton, which compares with 0.828 kW/ton before the optimization project.

Additionally, the project has allowed Hershey Medical Center to significantly decrease its carbon footprint. In total, it saved 7 million pounds of CO_2 emissions through March 2017. It also saves more than 1.4 million gallons of water per year as a result of the reduced energy consumption. Following completion, the project garnered the U.S. Green Building Council's Central Pennsylvania Forever Green award.

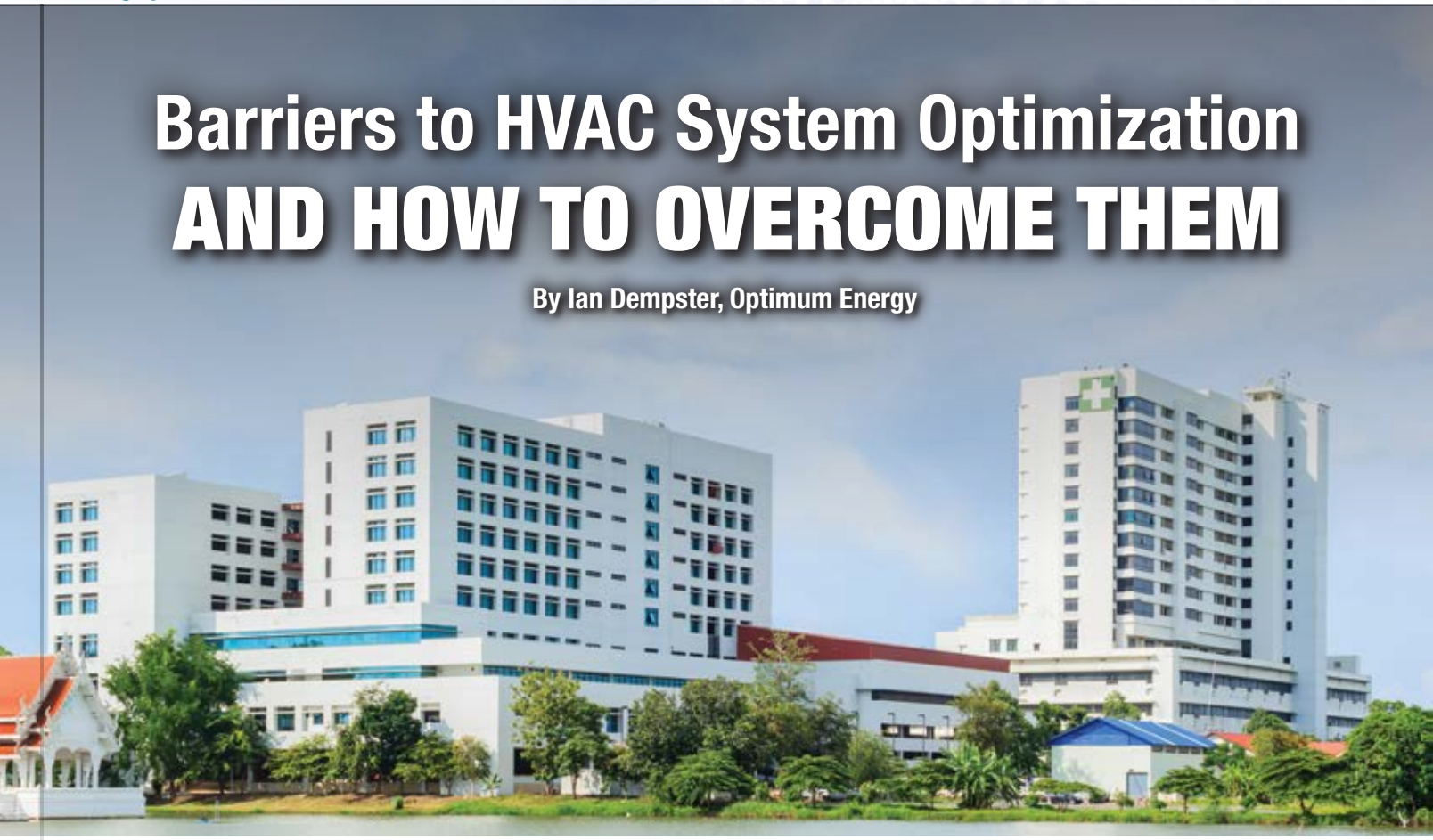
"Through this project, we are more aware of energy efficiency and savings," said Kanoff. "It's helping the team see the bigger picture – we're not just providing chilled water, but we're doing it as efficiently as possible and, ultimately, saving money." BP

For more information about Optimum Energy's OptiCx platform visit www.optimumenergyco.com.

To read similar ***Cooling System Assessment*** articles please visit http://coolingbestpractices.com/system-assessments/cooling-controls.

Barriers to HVAC System Optimization AND HOW TO OVERCOME THEM

By Ian Dempster, Optimum Energy



Given that HVAC systems typically account for 44% of commercial buildings' energy consumption,[1] HVAC optimization should be a priority efficiency upgrade after lighting improvements and other low-hanging fruit. Full-scale HVAC optimization typically reduces energy usage and costs by 20 to 40%, improves system reliability by operating equipment more efficiently and at optimal temperatures, ensures consistently healthy air quality and building comfort, and reduces a building's carbon footprint.

The term "optimization" is often applied loosely to various types of controls and upgrades in the HVAC world, but truly optimizing an HVAC plant means automatically controlling HVAC equipment as a holistic system, around the clock, to use the least amount of energy without sacrificing building performance. The chillers, boilers, air handling units, ductwork, diffusers, thermostats, sensors, and more must work together like a well-coordinated team to yield the full benefits. In addition, optimization software should continually capture and analyze system data to determine additional measures that will improve efficiency and provide performance metrics.

Optimization can be a significant project, but given the immediate savings and a typical payback period of less than four years, it makes good sense to undertake it.

What usually holds people back from pursuing optimization is one or more of three common barriers: concerns about optimization in

> "Optimization can be a significant project, but given the immediate savings and a typical payback period of less than four years, it makes good sense to undertake it."
>
> — Ian Dempster, Optimum Energy

sensitive environments, uncertainty about results, and cost accounting. Facility executives can address each of these issues with careful project planning and mitigation strategies.

Sensitive Environments

Facility operators are understandably hesitant about optimizing HVAC systems in environments where maintaining precise temperatures and other climate factors is essential. In a hospital, for example, spaces like operating rooms and emergency rooms can't go offline at any time. Project leaders can mitigate risk by detailing testing methodology, backup plans in case of performance problems, and the best low-occupancy times for implementation and testing.

Air quality, freshness, and humidity also are important in sensitive environments, and ultimately an optimization project should give facility operators better control of these factors. As for temperature, optimization will improve consistency by preventing the heating system from fighting the cooling system, creating instability and energy waste.

The implementation process may also reveal issues that have been masked. The project may be an opportunity to upgrade air filtration, for example — that's not affected by optimization, but it is important to establishing good air quality.

Uncertain Results

It's hard to justify the budget for an optimization project if you can't verify predicted results — and I've seen savings estimates produced at the beginning of an optimization project end up off by up to 50%. This can happen when the facility doesn't have a believable energy baseline, which renders estimates uncertain. It can also happen when the optimization project does not build in a continuous improvement process. Another

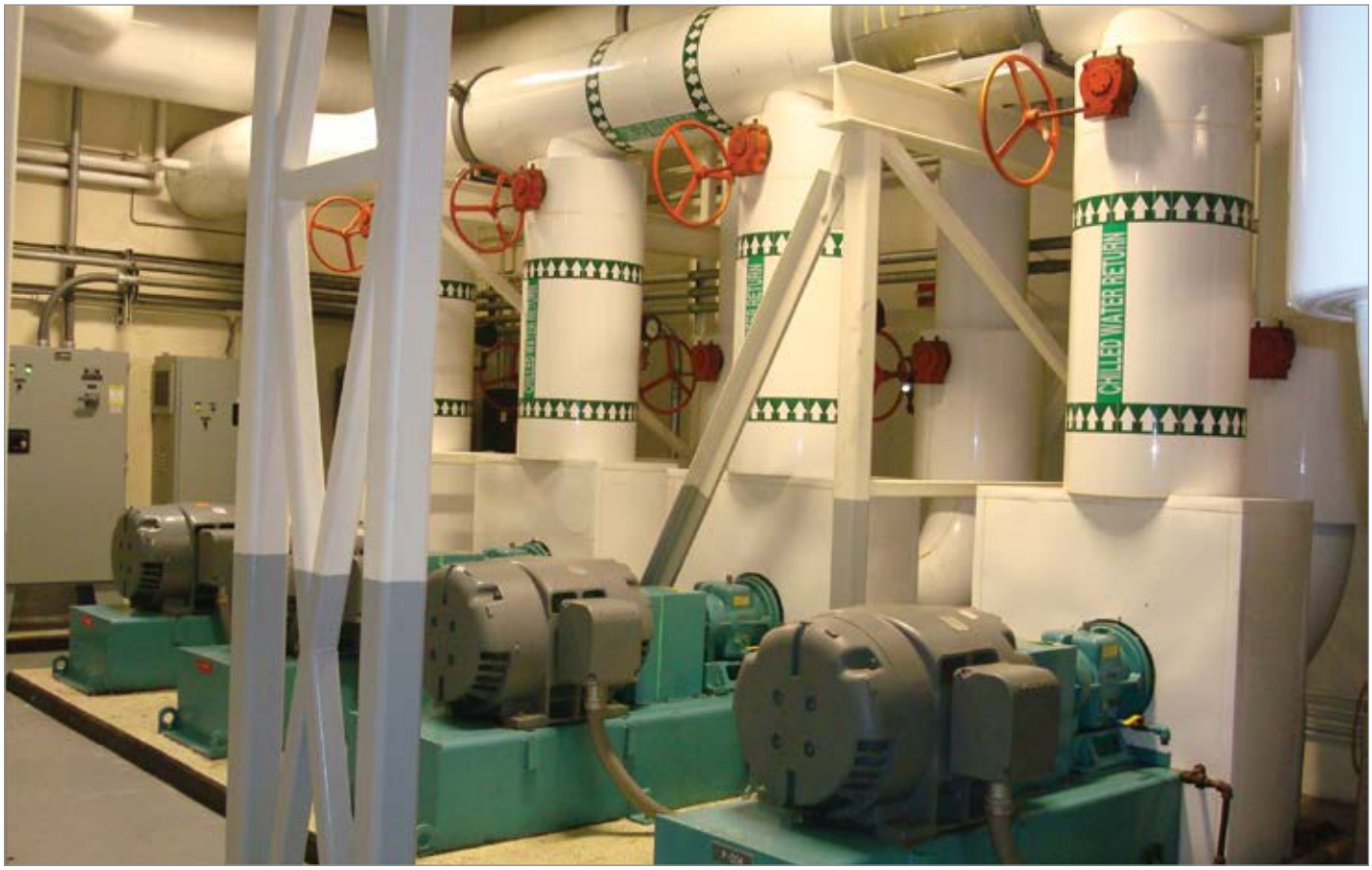
BARRIERS TO HVAC SYSTEM OPTIMIZATION AND HOW TO OVERCOME THEM

Ian Dempster is Senior Director of Product Innovation at Optimum Energy and a certified energy manager (CEM).

factor that can depress savings is a lack of buy-in from facility operators, which results in their operating the system manually, or even removing it from optimization entirely.

Project leaders can overcome these challenges by taking these steps:

- Before moving forward with a project, correlate all power draws with the facility's utility bills, vet the energy model the vendor employs, and understand the assumptions it is based on.
- Make sure all HVAC equipment is modeled and its energy impact is accounted for so that you don't end up doing something like optimizing the chilled water system to save energy on the chillers, but then causing the air handler fans to ramp up to counter an overly ambitious chilled water reset, resulting in more fan energy usage across your building.
- Make sure there's a measurement and verification plan in place to prove the actual results, verify that continuous monitoring is part of the project, and budget for at least a year of post-project follow-up and monthly energy reports.
- Have an internal champion who understands where the savings come from and the technology involved, and who has seen it in action. This is especially important when the impetus for optimization is coming from outside the on-the-ground facility management staff.



Well-designed optimization projects can minimize resource use in chilled water plants, resulting in immediate savings and significant contributions to sustainability goals.

A clear method of presenting energy usage and savings data is essential to maintaining a successful HVAC optimization project.

- Share new techniques and practices with operators and facilities engineers, and provide training and possibly visits to other optimized facilities as early in the project as possible. In addition to moving the project forward, this kind of orientation can generate feedback on optimization factors that might be overlooked without the input of the people who operate the building.

Cost Accounting

Project approvers don't always have a holistic view of all the work that various players in the project have to do, how each aspect will affect the outcome, and how to cover costs. You may need to balance up-front capital costs with optimal ROI — sometimes you have to spend more initially to get the desired ROI. Consider sources of funding other than your capital budget — for example, financing via your local utility or another entity based on anticipated savings.

Older buildings and older equipment can increase costs, as it may be necessary to replace or upgrade components. A phased approach can make this financially feasible. For instance, you could deploy software alone to achieve partial optimization, and then use the savings over time to fund mechanical equipment and system upgrades that will fully optimize your system. To do this effectively, establish a priority order based on savings potential, with a focus on easy pickings, such as setpoint resets and cooling tower improvements, before spending hundreds of thousands of dollars on a new chiller.

The most successful optimization projects grow from early collaboration with facility operators, controls contractors and equipment vendors, as well as training on the technology. A good optimization provider will provide an analysis of the facility's current operation, how efficient it is, and how it will operate after the project.

A well-defined project plan will deal not only with the installation and integration of the optimization technology, but also all required testing, post-project measurement and verification, and data analysis for further system efficiency improvement. With all these elements in hand, facility executives can be confident that an optimization project will deliver maximum savings and operational benefits at an appropriate ROI. BP

About the Author
Ian Dempster is Senior Director of Product Innovation at Optimum Energy and a certified energy manager (CEM). He directs multiple simultaneous R&D projects, drawing on a 16-year engineering career that spans three continents.

All photos courtesy of Optimum Energy. For more information, please visit www.optimumenergyco.com.

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1 U.S. Energy Information Administration 2012 Commercial Buildings Energy Consumption Survey: Energy Usage Summary: March 2016. (2016, March 18). Retrieved August 13, 2018, from https://www.eia.gov/consumption/commercial/reports/2012/energyusage/

Smardt Chillers with Danfoss Turbocor Compressors Ride Elevator to BOOST MEDICAL CENTER'S ENERGY SAVINGS

By Ken Koehler, Danfoss

Founded in 1837 and named after the only physician to sign the U.S. Constitution — Benjamin Rush — Rush University Medical Center (RUMC) is now Chicago's second-largest hospital with multi-story buildings that dominate the city's medical district. But that prestigious location posed problems when RUMC's 11-story Professional Building 2 needed to replace two aging centrifugal chillers. It appeared the only alternative was to move a crane down a crowded street to lower new chillers through the roof. But some simple surgery made it possible for Smardt split-shell chillers with Danfoss Turbocor® compressors to simply take an elevator up

"The professional building was using two fixed-speed 300-ton water-cooled centrifugal chillers."

— Mike Scalleta, Mechanical Systems Manager at RUMC

to the penthouse mechanical room, a solution that cut installation costs while boosting energy savings.

"The professional building was using two fixed-speed 300-ton water-cooled centrifugal chillers," said Mike Scalleta, Mechanical Systems Manager at RUMC. "They were installed when the building was built in the 1970s. Consequently, the old centrifugal chillers were using twice the energy compared to today's more efficient variable-speed chillers. It was time for them to go. The problem was we'd have to cut open the mechanical room and use a crane to drop in conventional replacement chillers. Fortunately, we learned Smardt had a solution. Their split-shell Smardt chiller design with compact Danfoss Turbocor centrifugal compressors could be taken apart to fit into our freight elevator. Using the elevator would minimize building disruption and reduce installation costs, and the efficiency of a variable-speed Smardt chiller would dramatically cut our energy costs."

As the worldwide leader in oil-free magnetic bearing chiller technology, Smardt sought to significantly reduce installation costs and boost efficiency — helping the overall bottom line.

RUMC replaced two aging fixed-speed 300-ton water-cooled centrifugal chillers (shown here) with energy-efficient Smardt split-shell chillers with Danfoss Turbocor compressors, reducing installation costs and saving $75,000 in annual operating costs.

Split-shell Chiller Fits Big Efficiency in a Tight Space

The energy efficiency of the Smardt chiller turned out to be a big plus that fit into a small space. According to Bullock, Logan and Associates' Curt Bullock, Jr., a Chicago representative for Smardt, the difference between the Smardt chiller and the old centrifugal chiller was night and day. Bullock calculates that when the old chiller was new, its integrated part-load value (IPLV) was 0.716 kW/ton but used oil-lubricated bearings. Because oil fouls heat exchanger tubes over time, actual efficiency was worse.

"In comparison, the IPLV of the Smardt chiller is 0.315 kW/ton — 57% more efficient," said Bullock. "That's partly because there are no oil-related heat transfer losses and no mechanical-bearing friction losses. Another energy-saving feature is the compressor's ability to adjust automatically to off-design conditions. The Danfoss Turbocor TT400 compressor can turn down capacity to 10% of its total capacity. By automatically matching capacity to the load, the compressor reduces its speed, which also reduces energy consumption."

But all that efficiency wouldn't do any good if the chiller didn't fit into the mechanical room.

"Professional Building 2 is sandwiched between Harrison Street, other professional buildings and rail lines in the Medical District," said Carl Wigginton, Vice president of Service for Murphy & Miller, Inc., the Chicago-based HVAC contracting firm who handled the installation. "There is no easy access. The front of the building is a little cul-de-sac where they turn cars around, and that's where the crane would have to go. It's a big reach — the crane would have to come in about 100 feet, then travel another 100 feet to the mechanical room

SMARDT CHILLERS WITH DANFOSS TURBOCOR COMPRESSORS RIDE ELEVATOR TO BOOST MEDICAL CENTER'S ENERGY SAVINGS

doorway. But, there is a freight elevator that goes right to the penthouse mechanical room. It's so much easier that way — if a chiller can fit into the elevator."

The building's large freight elevator was rated to hold up to 7,000 pounds. A conventional 300-ton centrifugal chiller would weigh around 12,000 pounds empty. Consequently, the weight and size dimensions prohibit using the elevator. In contrast, the empty weight of a 300-ton WA0962HG4 Smardt chiller is about 8,500 pounds — and designed to be taken apart and easily reassembled.

"This Smardt chiller has a split-able shell design," said Wigginton. "That made it possible to disassemble the evaporator and condenser shells. Disassembly took about half a day.

We transported the parts by elevator to the penthouse. It took six trips. The first two trips transported the evaporator, and two more trips for the condenser. Then, the control panel and miscellaneous components took one trip, and the compressors took one trip."

"Compare that with getting permits to shut down streets, disrupt traffic and block the building entrance with a crane. Plus, we would have to cut through the penthouse to give the crane access to the chiller site. You can see the advantages of this particular Smardt chiller configuration that uses two 150-ton Danfoss Turbocor TT400 compressors. The compressors weigh only about 300 pounds each, so we easily fit all four compressors into the elevator."

Inside the mechanical room, it took two technicians five days to reassemble the shells, compressors and control panel and level the chiller. The next week, control and electric wiring were connected along with piping and valves.

Reducing Centrifugal Compressor Complexity with Oil-free Magnetic Bearings

The installation was also simplified because Danfoss Turbocor compressors don't require an oil management system. "The Danfoss Turbocor compressor uses oil-free magnetic bearings," said Ken Koehler, Key Account Manager for Danfoss. "In a conventional hermetic compressor, the shaft rides on a thin layer of oil on mechanical bearings. Because

the rotational speed of the shaft may exceed 35,000 RPM, oil is needed to minimize friction and heat buildup. The bearings also keep the shaft properly aligned with the stationary elements.

"In a hermetic compressor, oil circulates within the refrigerant gas. To maintain oil at proper levels, the oil management system uses elaborate piping, traps and risers. But Smardt chillers avoid all that complexity. Because the Danfoss Turbocor centrifugal shaft levitates within a magnetic field, the need for oil is eliminated."

Koehler explains the Danfoss Turbocor shaft doesn't physically contact bearings in normal operation. Instead, the shaft rotates within ten separately controlled electro-magnetic cushions that continually change strength, slightly pushing or pulling the shaft to maintain its position.

"Danfoss Turbocor magnetic bearings use a digital controller that processes signals from 10 sensor coils," said Rob Silecchia, Director of Healthcare and Pharma Applications at Smardt Chiller Group. "Shaft movements of less than 0.00002-inch are detected, and the magnetic field is adjusted to maintain the shaft orbit. Backup carbon or roller bearings are used only to hold the shaft when the compressor powers down."

The Danfoss Turbocor compressor's digital intelligence also incorporates a powerful but user-friendly control system that interfaces with the Smardt chiller controller. The full-color control interface simplifies system configuration and commissioning through the chiller controller.

"Danfoss' monitoring software presents all the compressor operational data we need," said Wigginton. "The software is pulling in data from multiple sensor readouts. Temperatures, pressures, heat transfer across bundles, load demand, maximum and minimum RPM, compression ratio and mass flow, amp draw — it's all there through the Smardt controller. It really simplifies setup and startup. We appreciated the support the Smardt rep — Bullock, Logan and Associates — provided. And our techs took advantage of the training Danfoss provided. The compressors are so easy to work with, we had no problem finishing the job ourselves."

The upgraded installation at RUMC includes a new 300-ton chiller with two 150-ton compressors.

Smardt Benefits for a Hospital Application

What's more, RUMC's utility — Commonwealth Edison — gave the hospital a $24,000 rebate for using a variable-speed chiller. According to Bullock, the efficiency of the Smardt chiller beat out several competitive conventional variable-speed chillers.

"The size of the rebate is $10,000 more than they would have gotten with a competitive variable-speed chiller," Bullock emphasizes. "The Smardt chiller minimizes the number of amps used at startup and during peak electric periods. The calculated difference in efficiency meant that over the eight-month cooling season, the new chiller saved about $12,000 more in utility costs than the proposed replacement chiller. In comparison with the old chiller, however, the new Smardt chiller saved approximately $75,000.00 in annual operating costs. When you add in

SMARDT CHILLERS WITH DANFOSS TURBOCOR COMPRESSORS RIDE ELEVATOR TO BOOST MEDICAL CENTER'S ENERGY SAVINGS

the installation savings, the cost difference between the split-shell Smardt chiller and the competing chiller paid for itself in the first year of operation."

Another benefit is the Smardt chiller's quietness. "Sound transmission is always a concern with a chiller — especially in a hospital setting," said Scalleta. "With a Smardt chiller, the magnetic bearings position the shaft so precisely, there's hardly any noise or vibration. The chiller does not have vibration-damping springs or sound-attenuating blankets. In fact, when we first visited the mechanical room to see the Smardt chiller in operation, we weren't sure it was running — it's that quiet compared to our old fixed-speed centrifugal chiller."

The new compressor's user-friendly control system interfaces with the chiller controller, helping simplify system configuration and commissioning.

Combining the installation, efficiency and acoustic advantages, it was not a difficult decision when RUMC accelerated the replacement of its second old centrifugal chiller with another split-shell Smardt chiller just three months after the first was installed.

"The Smardt chiller runs smoothly and quietly," said Scalleta. "That's important to us, and so are the energy and maintenance benefits. All the problems with oil are a thing of the past, because there is no oil. There's very little maintenance with these units. Smardt and Danfoss have created a clean, compact chiller design that fits perfectly into our operation." BP

About the Author
Ken Koehler serves as a Senior Key Account Manager for Danfoss, the world's leading manufacturer of high-efficiency, oil-free magnetic bearing centrifugal compressors. He has 30 years of experience in both global HVAC and aerospace/defense, including sales, project management, quality, and sustaining engineering. Koehler can be reached at ken.koehler@danfoss.com, or 850-504-4821.

All photos courtesy of Danfoss. For more information, visit www.danfoss.com.

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"All the problems with oil are a thing of the past, because there is no oil. There's very little maintenance with these units. Smardt and Danfoss have created a clean, compact chiller design that fits perfectly into our operation."

— Mike Scalleta, Mechanical Systems Manager at RUMC

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SUNDAY, OCTOBER 13, 2019

9:00AM–3:00PM	Exhibitor-Only Pre-Registration
9:00AM–6:00PM	Exhibitor Move-In
3:00PM–6:00PM	Conference Registration Open
6:00PM–8:00PM	Welcome Reception

MONDAY, OCTOBER 14, 2019

7:00AM–11:00AM	Exhibitor Registration and Move-in
8:30AM–10:00AM	Opening Session
10:15AM–12:15PM	Conference Session #1
12:00PM–6:00PM	**EXPO FLOOR OPEN**
1:30PM–2:30PM	Energy Treasure Hunt Workshop #1
2:45PM–4:45PM	Conference Session #2
TBD	Networking Event!!

TUESDAY, OCTOBER 15, 2019

7:00AM–8:00AM	Continental Breakfast*
8:00AM–9:30AM	Plenary Session
9:45AM–11:45AM	Conference Session #3
12:00PM–6:00PM	**EXPO FLOOR OPEN**
1:30PM–2:30PM	Energy Treasure Hunt Workshop #2
2:45PM–4:45PM	Conference Session #4
5:00PM	Energy Treasure Hunt Raffle Winners Announced!!**

WEDNESDAY, OCTOBER 16, 2019

7:00AM–12:00PM	Exhibitor Move-out
7:00AM–8:00AM	Continental Breakfast*
8:00AM–10:00AM	Conference Session #5
10:15AM–12:15PM	Conference Session #6

4 TRACKS PER CONFERENCE SESSION

TRACK 1:
COMPRESSED AIR SUPPLY STRATEGIES

TRACK 2:
COMPRESSED AIR DEMAND REDUCTION

TRACK 3:
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Show Report: Chillers, Vacuum & Compressed Air at the

NPE 2018 PLASTICS SHOWCASE

By Rod Smith, Chiller & Cooling Best Practices Magazine

The NPE 2018 International Plastics Showcase was held at the Orange County Convention Center in Orlando, Florida, May 7-11. Setting all-time records, the Show attracted 2,180 exhibitors — including Chiller & Cooling Best Practices and Compressed Air Best Practices® Magazines! Over 1,200,000 square feet of exhibition space was used, breaking the all-time NPE record. Held once every three years, NPE 2018 registered attendance was 56,000.

The plastics industry is the 4th largest in the U.S. It's a major user of all the technologies we cover including blowers, vacuum, chillers and compressed air system components. Compressed air pressure requirements vary significantly for the plastics industry. Below is a simplified attempt to list some of the applications in the plastics industry

Process Chillers in Plastics

- Blown film
- Extruders (supporting liquid ring vacuum pumps)
- Injection molding
- Blow molding

> "The plastics industry is the 4th largest in the U.S. It's a major user of all the technologies we cover including blowers, vacuum, chillers and compressed air system components."

Vacuum/Pressure in Plastics*

- Pellet conveying and drying
- Extruder venting, cooling/drying and calibration of extruded products
- Injection molding, thermoforming and vacuum bagging
- Gluing plastic parts and plastic welding
- Forming Expanded polystyrene

*Source: Gardner Denver brochure "Plastics Industry Vacuum & Pressure Products"

Compressed Air in Plastics

- PET bottle blow molding: 510-590 psi, (35-40 bar)
- PET bottle blow molding with lightweight plastics: 290-365 psi (20-25 bar)
- PET bottle blow molding with custom intricate design: 650 psi (45 bar)
- Rotational molds for plastic car parts or milk jugs: 100 psi (7 bar)
- Bottle labeling (100 psi-7 bar) and drying with blow-off (1.3 to 3 psi)

This event is produced by the Plastics Industry Association (PLASTICS), formerly SPI. They claim to be the only organization supporting the entire plastics supply chain, representing nearly one million workers in this $404 billion U.S. industry. Since 1937, PLASTICS has been working to make its members and the industry more globally competitive while advancing recycling and sustainability.

Chiller Technology Focused on Plastics

Chase Cooling Systems™ had a large booth displaying their QBE Series (0.6 to 7 tons) and CWE Series (3 to 40 tons) fluid chillers. Both product lines offer an optional hot gas bypass valve for temperature-sensitive processes, which is very common in plastics. All the components are "state-of-the-market" using environmentally friendly refrigerants R407C or R410A and efficient hermetic refrigeration compressor technologies selected for optimal performance (reciprocating, scroll or rotary). This firm is based just outside Pittsburgh, PA. "We are excited to continue to grow in the plastics industry," said Engineering Manager Phil Shaver. "We particularly see growth with blown film and extrusion applications."

Frigel is an Italian chiller manufacturer with an iron grip on the plastics industry. Their Marketing Manager, Al Fosco, says this is due to their

Phil Shaver, Andrea Farbis, Jim Miller, Chip Miller, Massimiliano Parisi and Alessandro Milazzo at the Chase Cooling Systems™ booth (left to right).

Al Fosco, Lou Zavala and CEO Duccio Dorin at the Frigel booth (left to right).

Robert Kennery at the MOKON Thermal Fluid Systems booth.

SHOW REPORT: CHILLERS, VACUUM & COMPRESSED AIR AT THE NPE 2018 PLASTICS SHOWCASE

Donald Tilley and Jason Hobbs next to the Gardner Denver CHL Series Chiller (left to right).

Dave Shanahan and Jason Katenin next to a Gardner Denver Bellis & Morcom WH28 oil-free air compressor (left to right).

Steve Bruno, Walt Pitts, Dusty Taylor and Walter See at the Atlas Copco booth (left to right).

profound understanding of the process chilling needs of the plastics industry. When you walk around NPE, you see Frigel chillers in booth after booth of the injection molders. A single molding machine he explained, may simultaneously require several different temperatures of cooling fluid. A plant may have 20 different injection molders doing different things. That's a paradigm shift for me and a reminder not to take reliability for granted. For this reason, the Microgel chiller from Frigel has a very broad cooling range from 47 ˚F to 195 ˚F. Fosco said they have introduced a proprietary PLC able to do energy monitoring of actual and average kWh with data logging capabilities. Frigel is coaching injection molders on how to save chiller energy by increasing cooling temperatures from 65 ˚F to 80 ˚F. Fosco's rule of thumb is a gain of 2% of capacity for every 1 ˚F. The new Microgel PLC is datalogging pressure, temperature and gallons per minute of chilled water at each injection molder and helping them conduct system assessments.

I did have the chance to meet Frigel CEO Duccio Dorin who said they are based near Padua in Italy and have recently acquired another chiller company named Greenbox. He said Greenbox brings complementary R&D, technology and vertical markets such as die casting in metal processing. I was impressed. They have launched a new factory in Brazil, a joint venture in India and are expanding strategically into the beverage industry — where they see opportunities for improvement in cooling processes.

Speaking of temperature control, I had the chance to meet General Manager Rob Kennery at the MOKON booth. He introduced me to their Full Range water-based temperature control system offering a combination heating and chilling system all in one package. That blew me away. This system offers process heating and chilling from -20 ˚F to 300 ˚F (-29 ˚C to 149 ˚C). The system features heating capacities up to 96 kW, pumping capacities up to 120 GPM and up to 60 ton chilling capacities.

The Gardner Denver booth held a pleasant surprise for me. They have launched a new process chiller product line called the CHL Series. The range has models with cooling capacities ranging from 0.6 to 104.6 tons. Who better, to recommend process chillers, than the manufacturer of Bellis & Morcom oil-free PET bottle blowing air compressors? This technology has been a market leader since it was launched in 1852! It is a water-cooled, capacity control or variable speed drive, 3-stage, oil-free reciprocating air compressor able to deliver very efficient performance when matched up with the right demand profile. The Gardner Denver booth now provides solutions to almost all the utility requirements of a plastics plant. The booth displayed the aforementioned chillers, the Bellis & Morcom WH28 PET oil-free (230 kW) air compressor, 100

psi class rotary screw air compressors, low-pressure blowers from Robuschi for conveying, and of course the huge line-up (including Elmo Rietschle) of vacuum/pressure technologies they own.

The opportunities this consolidated product offering, at Gardner Denver, provides for sales channels to "add technical application value" to factories is tremendous. A Gardner Denver representative could visit a plastic extrusion plant, for example, and replace liquid ring vacuum pumps with dry rotary vane pumps — and then help the client capitalize on the significant reduction in chilled water load by providing a significantly smaller chiller than the one in use. I can assure you today there are virtually zero chiller companies able to coach plastic extruders on how to reduce cooling loads by moving away from liquid ring vacuum pumps — the biggest chilled water consumer in the plant.

Compressed Air, Blower and Vacuum Technology Focused on Plastics

Which sales and service companies, in the field, will embrace teaching factories how to use less vacuum or less process cooling in their plants? The compressed air industry began this journey 25 years ago and there's still a ton of work to be done. How often do compressed air people work on helping plants understand their process cooling costs — so they move away from water-cooled air compressors if possible? Process chillers and vacuum system assessments are in their infancy — and we are excited to see it get started to benefit factory profits and efficiency.

Atlas Copco Compressors had their full range of compressed air, nitrogen and vacuum solutions on display. Atlas Copco offers a broad range of high-pressure air compressors for 25-40 bar, sometimes overshadowed by their GA Series rotary screw air compressors with standard Variable Speed Drives. Product Marketing Manager Steve Bruno showed me a very compact GA 30 VSD full-featured (FF) unit in the booth. I remember when integrated compressed air dryers seemed exotic, now it's an absolute standard feature used more often than not and saving space in a plant.

Atlas Copco Vacuum Product Marketing Manager Walter See walked me through a GHS VSD+ Series rotary screw vacuum pump. He told me the plastics industry is an excellent market for vacuum system centralization projects. One example he pointed out is the presence of many older vacuum venturis. I was interested in the ESv central controller able to provide centralized control for multiple vacuum pumps. This is an exciting opportunity for all kinds of plants to request a system assessment of their vacuum system. It's also an exciting opportunity for both vacuum and compressed air system specialists to consider adding "vacuum system assessments" to their services. Atlas Copco is bringing all their experience and technology, learned from years of compressed air system optimization,

Jarno Manzke, Jason Reid, Michael Camber, Joe D'Orazio and Brennen Schulz from Kaeser Compressors (left to right).

Joe Mashburn and Juan Manuel Ortiz, from AF Compressors, next to a cut-away of their 3-stage oil-free piston PET air compressor.

George Sarkis next to the Busch Mink Series vacuum pump.

SHOW REPORT: CHILLERS, VACUUM & COMPRESSED AIR AT THE NPE 2018 PLASTICS SHOWCASE

to the vacuum industry — an industry dominated by decentralized vacuum pumps sold to OEM's manufacturing production equipment.

Busch is one of the global leaders in vacuum technology. I spoke with their Sales Manager (South) George Sarkis at their booth where he showed me their MINK dry claw and their DOLPHIN LX liquid ring vacuum pumps. Both are significant product lines used in the plastics industry. George reminded me of the importance of reliability — a hallmark of Busch technologies. Production uptime is always the most important factor in vacuum technology and system selection. He said Busch often engages in vacuum centralization projects, but only after significant engineering work with clients is done to ensure their process reliability integrity is maintained. Plants may have several different vacuum applications running simultaneously and the entirety of the applications must be well understood first.

Kaeser Compressors displayed a complete containerized compressed air system which clients can purchase or opt to pay for compressed air as a utility ($ per cfm). Really cool! These completely customizable systems have all electrics pre-wired, any instrumentation one wants and Sigma Air Manager 4.0 integration to run the system optimally and data log all key performance indicators. An interesting feature was their "Air Main Charging Valve" designed to regulate the rate at which piping systems re-pressurize. This ensures plants don't flow more air through the compressed air dryers than they can handle — during this "demand event." The Kaeser booth featured their standard rotary screw air compressors for 100 psi air, their new and improved SmartPipe™ System (with aluminum fittings) now up to 8" diameter, tri-lobe and rotary screw blowers for plastics pneumatic conveying and boosters to 680-700 psi for blow molders.

AF Compressors has quietly built itself into one of the leading global suppliers of high-pressure oil-free air compressors to the PET bottling industry. Sales Manager Joe Mashburn said their big news in 2018 was the introduction of their new "low pressure" 116 psi (8 bar) OPC Range of oil-free piston air compressors. Targeting the food and beverage, chemical and pharmaceutical industries, Mashburn said this is a very complete range offering ten models rated for 8 and 10 bar (145 psi) for flows from 272 to 1,925 cfm (at 116 psi). AF claims their 2-stage oil free piston technology offers the "lowest maintenance and energy costs" — over other air compressor technologies. BP

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INDUSTRIAL COOLING SYSTEM INDUSTRY NEWS

Bacharach Acquires Neutronics

Bacharach, Inc., a leading provider of HVAC-R gas instrumentation and energy management solutions, announced the acquisition of Neutronics Inc. ("Neutronics" or "the Company"), a world-class provider of refrigerant and gas analyzers. Neutronics' technologies serve the automotive and commercial HVAC markets, and provide high-purity oxygen analyzers to the semi-conductor industry, and self-contained breathing units to the safety and rescue industry. Financial terms of the private transaction were not disclosed.

The combination of Bacharach and Neutronics will significantly strengthen Bacharach's ability to provide the worldwide HVAC-R and automotive markets with high quality fixed and portable gas test and measurement Instrumentation.

"Neutronics is the established leader in refrigerant identifiers for the global automotive and HVAC-R industries and has complimentary NDIR sensor technology in its instruments, which are designed and manufactured in its Exton, Pennsylvania facility," said Doug Keeports, CEO of Bacharach. "This acquisition aligns well with Bacharach's strategic plan and strong focus on growing our market leadership in instrumentation and refrigerant monitoring, as well as compliments Bacharach's expertise and strengths in the combustion and emissions analysis markets. We are happy to welcome the Neutronics team and look forward to continue growing our combined business."

Neutronics will continue to carry its existing brand and operate under the leadership of Gary Halpern, President, and David Halpern, COO, who joined their father Terry Halpern at the company over 40 years ago. Terry founded the business in 1976 with a focus on the measurement and control of oxygen and other gases for safety, environmental, and general industrial applications.

Gary, David and their executive team bring over 150 years of industry experience to the Bacharach team. Neutronics will operate as a wholly owned subsidiary of Bacharach. Management teams of both businesses will work to leverage their combined strengths, while providing its customers and supplier partners with the same high quality service as always.

About Bacharach

Bacharach is a provider of cleantech solutions for gas and refrigerant leak detection, combustion and emissions analysis instrumentation, and energy management for commercial and industrial applications. Bacharach products make the heating, ventilation, air-conditioning and refrigeration (HVAC-R) industries safer, cleaner, and more energy efficient, enabling customers to increase productivity, reduce costs, and protect lives and the environment. Please visit www.mybacharach.com for additional information.

About Neutronics

Neutronics Inc. is a world-class provider of gas analysis and gas handling technologies. The three operating divisions, Neutronics Refrigerant Analysis, Gas Analysis Solutions, and Biomarine Inc., provide state-of-the-art products and services for commercial, industrial, governmental, and military clients around the world. Please visit www.neutronicsinc.com for additional information.

New Video Explores Performance Characteristics Between Grade 301L and Type 304 Stainless Steel in Cooling Towers

SPX Cooling Technologies, Inc., a full-line, full-service industry leader in the design and manufacture of evaporative cooling towers and air-cooled heat exchangers, announces the release of an informational video that examines the differences between Grade 301L and Grade 304 stainless steel for cooling tower applications.

In this video, SPX Cooling Technologies Materials Engineer Joe Evans discusses the science behind the material attributes of 301L and 304 stainless steel and why 301L is the preferred material for Marley cooling towers when stainless steel components are specified. While nearly identical in their chromium and nickel content and ability to resist chemical attack and corrosion in typical cooling tower environments, the low-carbon content of Grade 301L offers superior corrosion resistance at welds compared with Grade 304.

INDUSTRIAL COOLING SYSTEM INDUSTRY NEWS

In addition, the specific grade of 301L stainless steel used by SPX Cooling Technologies offers higher yield and tensile strength and better fatigue resistance. It also cold-works faster to reduce thinning and provide higher strength in formed areas.

To watch additional videos on cooling tower topics, visit: http://spxcooling.com/video.

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 heating, ventilation and air conditioning (HVAC), industrial, refrigeration and process cooling markets for nearly a century. SPX Cooling Technologies and its product brands are part of SPX Corporation. For more information, please visit www.spxcooling.com.

About SPX Corporation

SPX Corporation is a supplier of highly engineered products and technologies, holding leadership positions in the HVAC, detection and measurement, and engineered solutions markets. Based in Charlotte, North Carolina, SPX Corporation had approximately $1.4 billion in annual revenue in 2017 and more than 5,000 employees in about 15 countries. SPX Corporation is listed on the New York Stock Exchange under the ticker symbol "SPXC." For more information, please visit www.spx.com.

Danfoss Supports New Sustainable Cooling Report at the United Nations

On July 16, 2018 John Galyen, President of Danfoss North America joined a global panel at the United Nations in New York to discuss the first-ever report to quantify the growing risks and assess the opportunities of the global cooling challenge, which was developed with contributions from the Global Panel on Access to Cooling. Conclusions of the report include the important role of industry to solve growing cooling demand in a sustainable way, by thinking more holistically about heating and cooling and deploy the most efficient existing technology and develop new, innovative solutions for the most vulnerable.

Cooling is an essential need in everyone's modern daily life. In an increasingly warming

world, the impact of not having access to modern cooling solutions is profound. Deploying the most efficient, best-in-class technology brings huge environmental and socio-economic benefits, by responding to the growing cooling demand and reducing greenhouse gas emissions. In addition, creating sustainable, efficient cold chains can reduce food loss and keep vital medicine stored safely.

The new "Chilling Prospects: Providing Sustainable Cooling for All" report, released by Sustainable Energy for All (SEforALL) and the Kigali Cooling Efficiency Program (K-CEP), outlines recommendations on how to increase access to affordable and sustainable cooling solutions throughout the world.

As an industry leader in air-conditioning and refrigeration and member of SEforALL's initiative Cooling for All, Danfoss has directly contributed to the report with technological insights. The industry has a big role in sharing expertise on how to build a vision for a sustainable future with the best available technologies.

During the panel discussion, Galyen commented 'As the report has shown, we are challenged by heat extremes for the most vulnerable people, inefficient cold chains and a warming world. It underlines that we need to act today; and the good news is that, we have proven, available solutions to do so. Danfoss has solutions that help to properly control temperature in commercial buildings, food and vaccines. Industry has proven we can meet technological challenges. Now we need to take a holistic approach that includes supportive regulation, incentives, education and collaboration to deploy the proven technologies that are available today to achieve sustainable cooling for all.'

Danfoss is fully committed to accelerating energy efficiency as a way to provide cooling

John Galyen, President of Danfoss North America, speaks on 'Cooling for All' at the UN during United Nations High-Level Political Forum on July 16, 2018

access for all. The key focus is to enhance global adoption of efficient, sustainable cold chains to keep our food fresh and safe and preserve medicine and vaccines. Danfoss is also actively raising awareness about the need to scale up energy efficiency policy and action, such as minimum energy performance standards and labeling, to ensure the use of the best available technology.

The role of business is crucial in succeeding solving the world's cooling challenge, says Rachel Kyte, CEO and Special Representative of the United Nations Secretary-General for Sustainable Energy for All: "In a world facing continuously rising temperatures, access to cooling is not a luxury — it's essential for everyday life. To secure cold supply chains for fresh produce, safe storage of life-saving vaccines, safe work and housing conditions, we need the continued leadership from industry and businesses across many sectors. Businesses that put energy efficiency first and a focus on clean technologies will not only reap rewards but also help us achieve cooling for all and ensure we leave no one behind."

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 more than 25,000 employees and serving customers in more than 100 countries. We are still privately held by the founding family. Read more about us at www.danfoss.com.

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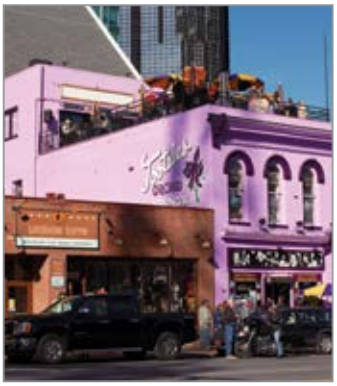


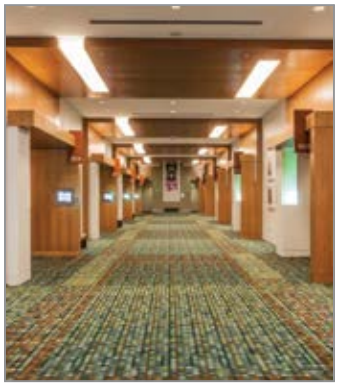


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