

MechanicalXchange

SPECIAL SUPPLEMENT



TRENDS IN COMMERCIAL, INDUSTRIAL, AND INSTITUTIONAL CONTRACTING

BROUGHT TO YOU BY

Air Conditioning | Heating | Refrigeration

the **NEWS**

 **MechanicalXchange**



MEET ZOOMLOCK[®]

FLAME-FREE REFRIGERANT FITTINGS



10 SECONDS. CONNECTED.



MAKE MONEY USING

ZoomLock[®]

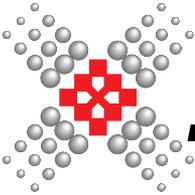
- Ten-second leak-proof **refrigerant** fitting.
- 40-60% time and cost savings per job.
- No brazing. No flame. No fire watch required.
- Available at Parker and Sporlan distributors.

Visit www.parker.com/zoomlock to calculate how much money ZoomLock Flame-Free Refrigerant Fittings will put on your bottom line and to get a free 10-second demo. Labor and time saving solutions from Parker Sporlan - helping your business win **MORE** business.™

zoomlock.com



ENGINEERING YOUR SUCCESS.



MechanicalXchange

SPECIAL SUPPLEMENT

04 | HVAC Industry Addresses Military Concerns



08 | Economizers Offer Many Benefits

10 | Device Driven



13 | C-Store Comparison

14 | Efficiency Propels Chiller Market

18 | Optimizing Commercial Boiler Systems



22 | The Bottom Line

Air Conditioning | Heating | Refrigeration
the **NEWS**

MechanicalXchange



Copyright 2018, by BNP Media. All rights reserved. The contents of this publication may not be reproduced in whole or in part without the consent of the publisher. The publisher is not responsible for product claims and representations.

Return Address: BNP Media, P.O. Box 2600, Troy, MI 48007, (248) 362-3700

HVAC Industry Addresses Military Concerns About VRF Systems

BY JOANNA TURPIN OF THE NEWS STAFF



BEST SOLUTION
Fujitsu contends that in many applications, VRF solutions are not only the best options for comfort, they are also the most efficient.

Last year, the Department of Defense (DoD) issued a surprising directive stating that VRF systems would no longer be permitted in U.S. Air Force facilities, and while not forbidden in Army facilities, they would be strongly discouraged. However, the Navy does not plan to restrict VRF systems, as long as they comply with *ASHRAE Standard 15, Safety Standard for Refrigeration Systems*.

A subsequent U.S. Army Corps of Engineers Bulletin offered three reasons for the new directive:

1. Concern over refrigerant concentration, as a typically sized VRF system contains enough refrigerant to potentially asphyxiate occupants in the event of a refrigerant leak;
2. Difficulty in locating refrigerant leaks due to long refrigerant lines that are common with VRF systems; and
3. Proprietary controls used by many VRF systems, which are in conflict with the legal requirement of using open protocol systems.

Last November, the DoD placed its own special requirements on VRF systems, citing the same “inherent risks” above, as well as adding its intent to study the technology’s life cycle costs — the reason being that VRF systems are relatively new within the U.S., which makes comparisons with traditional HVAC systems difficult. VRF manufacturers and the Air-Conditioning, Heating & Re-

frigeration Institute (AHRI) have since been engaged in an ongoing dialogue with the DoD to better understand its concerns and help explain the unique attributes of VRF systems.

REACTION

John Reynal, president, Encore Mechanical LLC, Southlake, Texas, has installed numerous VRF systems in Army facilities, but he was not too surprised by the recent directive.

“Our series of VRF installations on Army bases occurred after several conventional four-pipe boiler/chiller-type installations experienced troubled warranty periods and IAQ issues. We installed VRF systems in 17 new Army buildings serving the same purpose, which cut construction duration nearly in half, reduced upfront cost by 40 percent, and eliminated the warranty and IAQ problems through good design and installation.”

Reynal believes the DoD and the Corps of Engineers might have formed their negative opinions regarding VRF systems due to the technology being improperly installed by unqualified firms, which may have been a result of a procurement process that did not adjust for the new technology.

“Another reason may be the standard resistance to change, and/or because VRF is disruptive and threatens experts and businesses that



EDUCATIONAL BENEFITS

LG is working to educate the Department of Defense (DoD) decision-makers about the benefits of VRF technologies, such as LG’s Multi V family of products, that deliver high energy saving potential, minimum maintenance, and low failure risk.

specialize in older technologies.”

Scott McGinnis agreed with that last point. As branch manager of Direct Expansion Solutions (DXS), which is a representative for Daikin VRF systems in Dallas/Fort Worth, Texas, he believes there has been a concerted effort by some in the HVAC industry to discredit VRF as a viable option for many applications.

“It pays to discredit the competition, especially when that competition is gaining market share,” he said.

That may be the case, or it may just be that the Corps has a difficult time managing all the technology options that are now available for the armed services, said Andy Armstrong, vice president of sales and marketing, Fujitsu General America Inc.

“To achieve their goals requires input from many sources,” he said. “In this case, it seems that the input was a bit off target. But VRF solutions in many applications needed by the armed services are not only the best option for comfort, they are also the most efficient.”

And efficiency is extremely important, given that both former Presidents George W. Bush and Barack Obama issued executive orders that require federal agencies to reduce electrical consumptions by 25 percent over a 10-year span, said Reynal.

“VRF technology provides a way to achieve that mandate without the need for other upfront costs and maintenance required by other design choices that can require natural gas service to the building, or ground water well fields, or water chemical treatments,” he said.

REFRIGERANT CONCENTRATION

The question for many at this point is whether or not the Corps’ concerns over VRF systems are valid. Reynal would argue yes and no, adding that their concerns should hold true for any and all HVAC design choices, particularly when the procurement process does not properly qualify designers and/or installing contractors.

“Conventional system choices are based on 60-year-old technologies and are also susceptible to troublesome installations when untrained/unqualified technicians attempt to install them,” he said. “VRF is a much newer and more advanced technology that leverages the great efficiency of refrigerant to deliver many benefits over water and air systems, and it’s appropriate to select designers and contractors with greater scrutiny.”

It is also difficult to know whether the Corps’ concerns have merit, because it is not clear why the decision was made to restrict VRF systems in the first place, said Armstrong.

“Speculation would suggest that their concerns are tied to refrig-

eration concentration issues,” he said. “If indeed that is their concern, design choices and product application can be managed to keep all people within a facility safe and secure. VRF design and application engineers have developed methods to mitigate risk and keep occupants out of harm’s way due to asphyxiation.”

Of course, the best way to ensure occupants won’t be harmed is to comply with all codes and regulations, which also apply to refrigerant used in any other HVAC system, said McGinnis. That includes complying with ASHRAE Standard 15, which specifies the safe design, construction, installation, and operation of refrigeration systems.

“For those who want additional security, there are small monitors that can be installed and set to detect refrigerant at a threshold that is lower than the maximum ppm,” said Armstrong. “These can provide an audible alarm or be set up to disable the system in the event a leak is detected.”

Reynal agrees that the safeguard is proper design and installation, which includes observing *ASHRAE Standard 15*.

“We reached out to the manufacturers that had 35 years of experience in Asia and Europe before introducing the technology to the U.S. and found zero history of asphyxiation related to VRF systems,” he said.

LOCATING LEAKS

Regarding the Corps’ second concern that finding refrigerant leaks may be difficult due to VRF’s long refrigerant lines, it is true that all refrigerant systems could potentially leak. That said, VRF manufacturers have developed processes and training to support contractors through the VRF installation to ensure a high-quality refrigeration system, said Armstrong.

“When installed and commissioned to manufacturers’ specifications, there are rarely leaks in the refrigeration system,” he said. “Of course, leaks in these systems can happen when a pipe is pierced due to an outside source (work on the space, etc.), but as a rule, those leaks are not difficult to find, as piercing a high-pressure pipe will generally be visible and audible.”

Again, a properly installed VRF system should not leak, said



DOWNTOWN SOLUTION

Direct Expansion Solutions (DXS) engineers and sells numerous VRF projects, such as this one located in downtown Dallas.

McGinnis, but in the rare case it does, the leak usually occurs at the flare at the fan coil unit (FCU) or in the DX coil.

“The majority of VRF FCUs use flare fitting connections that, if not properly torqued, can become loose,” he said. “These are usually easy to find, and there should always be an access panel located next to these connection points. Most VRF manufacturers recommend re-torquing the flare nuts after a certain amount of run time, so if contractors do their jobs correctly, there should not be any long-term leaks in the piping runs.”

The bottom line is that leaks are extremely rare when VRF systems are properly installed, added Reynal.

“The difference is that newer, advanced technologies require training, tools, and testing that are different than systems that simply move air or water,” he said.

PROPRIETARY CONTROLS

Even though the Corps states that VRF systems’ proprietary controls are in conflict with the mandate to use open protocol systems, Reynal said that proprietary controls are much more common than previously thought, as most manufacturers internally control their refrigeration cycle utilizing proprietary communication.

“With VRF, because the components of the refrigeration cycle are located further apart, it makes it more noticeable,” he said. “Also, the controls common within VRF systems are meant for operating within the boundaries of the refrigeration cycle — they do not serve as a whole-building technology.”

Still, manufacturers have made significant improvements in their adaptability and compatibility to BACnet with their most recent series of equipment, noted Reynal, and there is nothing keeping the Army from having VRF systems monitored and managed through their existing BAS.

“We are seeing VRF manufacturers being super accommodating and providing universal integration,” said Reynal. “For instance, York provides what they call their Gateway for fast, simple integration of their VRF systems with BACnet, Metasys, or other BAS.”

Fujitsu systems are also easily connectable to both BACnet and LonWorks systems, giving facility managers access to all needed information, said Armstrong.

“Using the Fujitsu/Ventacity HVAC2 solution provides facility managers unprecedented access to system operation, including historical building operation, allowing predictive management options to save energy, improve reliability, enhance comfort, and advance future designs,” he said.

Daikin’s VRF system can also be integrated into any BAS, said McGinnis.

“The issue with the Corps is that they look at the VRF system as a multiple component system and not a single integrated system,” he said. “They need to realize that the VRF system is really a single system, just broken up into multiple components, none of which can operate on its own or within another manufacturer’s system.”

For example, a VRF heat recovery system has a condensing unit, changeover boxes, FCUs, and wall controllers, said McGinnis, and all these components use the same language in order to make the system work.

“You can’t expect someone else to properly integrate all those com-

ponents together,” he said. “That’s why VRF manufacturers do not allow third-party direct digital control (DDC) controllers to rewrite the internal codes that make the systems tick.”

LIFE CYCLE COSTS

The uncertain life cycle costs of a VRF system, including operation and maintenance, are what caused the DoD to take a closer look at the technology. But all comfort systems have become more complex and require trained technicians who understand the equipment they’re working on, said Armstrong.

VRF systems require minimal maintenance — regular filter changes and coil cleaning will keep the system running efficiently for many years, he said.

“Like other VRF manufacturers, Fujitsu has worked hard to ensure that if and when there is a service issue, the part is easy to replace for quick return to service,” said Armstrong. “It should also be noted that Fujitsu systems, like many VRF systems, are easy to design for redundancy, so a single unit out of service will not take down the entire facility.”

In reality, there is just not much to maintaining VRF systems that other technologies don’t require, too, including filter changes, checking the condensate drains, and a seasonal washing of outdoor coils, said Reynal.

“With VRF systems, there is no cost for water treatment, monthly cooling tower service, or third-party BACnet services,” he said.

The high level of self-diagnostics that a VRF system provides may also make for shorter service calls, said McGinnis.

“When everything is taken into account, the overall ownership of a VRF system has been proven to be a lower life cycle cost than other traditional systems,” he said.

The case regarding the use of VRF systems on military bases is not closed, as manufacturers are working closely with the DoD to find common ground.

“Since DoD initially raised questions regarding VRF over a year ago, we and our industry colleagues have had a constructive dialogue to address the strongest concerns expressed by some within DoD,” said John Taylor, senior vice president of government affairs, LG Electronics USA Inc.

LG is looking forward to continuing those discussions with the DoD, and the company is confident VRF can meet operational efficiency goals without compromising mission-critical activities, said Taylor.

“DoD and the services continue to use VRF systems at over 150 of their facilities around the world, and the General Services Administration (GSA) has endorsed VRF, too, as an important technology for meeting energy efficiency goals in government buildings,” he said. “VRF has a long history of growing global adoption because it delivers high energy saving potential, minimum maintenance, low failure risk, and greater load management.”

Given all these benefits of VRF, Reynal expects the Corps to retract this directive in the near future. Meanwhile, he’s not too worried about it, noting that he has installed VRF systems on Army bases since the directive was published.

“We simply don’t have time to be too concerned,” he said. “We are extremely busy trying to keep up with demand.” ■



THIS IS INCREASING PRODUCTIVITY

*SMART Service Tools
Wireless Temperature
and Pressure Sensors*

*Reads real-time pressures and temperatures
Calculates superheat and subcooling
Free app records, saves and emails data*

Several of your common diagnostic/service problems for HVAC/R can be solved with the SMART Service Tools without using hoses or manifold gauges. This reflects Parker's commitment to solving the world's greatest engineering challenges.

sporlan.com



ENGINEERING YOUR SUCCESS.

Economizers Offer Many Benefits

Devices reduce operating costs while improving comfort, IAQ

BY JOANNA TURPIN OF THE NEWS STAFF



QUICK PAYBACK
The key benefits of economizers are saving energy and lowering operational costs, and payback is generally less than five years. Courtesy, Daikin Applied

Economizers used in rooftop units and air handlers are multi-purpose devices that can improve both the energy efficiency and indoor environment in a wide range of commercial buildings. By increasing the outdoor air supply when the weather is mild, air-side economizers can provide “free cooling,” which reduces a building’s need for mechanical cooling and usually results in substantially lower utility bills.

As a key part of the ventilation system, economizers also improve the comfort and IAQ in a building, provided they are applied and used correctly. But, like any other HVAC component, they also need periodic maintenance to ensure they are operating as intended.

SIMPLE YET EFFECTIVE

An air-side economizer is a fairly simple device, consisting of a set of return and outside air dampers, as well as controls that sense when outside air is below a certain set point and can be used to cool a space. Conversely, when the controls determine that the outside temperature is above a certain set point, they close the outside air dampers to the minimum position and activate mechanical cooling to reach the desired temperature, explained Eric Taylor, marketing manager, Aaon.

Economizers are standard features in many air handlers, as energy codes, such as *ASHRAE Standard 90.1-2016*, require that they be installed in many geographic regions in the U.S. Some states also require heat recovery; however, HVAC equipment can be exempt from these regulations if it meets certain efficiency thresholds, said Bill Dietrich, product general manager - chillers, Daikin Applied.

The key benefits of economizers are saving energy and lowering operational costs, said Dietrich.

“Payback is generally less than five years, and economizers last for the life of the equipment,” he said.

The controls are also critical for maintaining energy efficiency. Daikin Applied’s DDC controller, for example, allows the system to control ventilation of CO₂ on demand as well as monitor airflow when cooling to ensure the economizers operate at peak efficiency. Optional fault diagnostics in the control system alert building managers when the economizer requires maintenance.

There are various types of control configurations available for air-side economizers, including those based on sensible temperature or enthalpy (temperature and humidity). Local codes may also dictate what type of controls must be used, explained Taylor.

“Title 24 in California, for example, requires that fault detection and diagnostics (FDD) controls be included with the economizer,” he said. “These controls ensure that the dampers and controls are working as they are intended and include alarms for sensor failures, when the unit is not economizing properly, when the damper is not modulating or is stuck open, or when an actuator is mechanically disconnected. Aon factory-installed economizers can include all of the necessary controls and components to meet this code.”

Most manufacturers offer a variety of control options that are dependent on the method of control the customer wishes to use. Economizers from Johnson Controls Inc. are capable of functioning off of single dry bulb, single enthalpy, and dual enthalpy readings with the application of field-installed sensors.

“Additionally, our economizers can be paired with multiple airflow options, such as barometric relief and powered exhaust fans,” said Matthew Schlegel, commercial product manager, Johnson Controls. “Contractors can determine which economizer configuration to use based on the building design and typical ambient conditions of the application. Our product selection tool offers detailed information on the application of each sensing option, and our sales team is highly trained to help customers in making these decisions.”

Economizers do add cost to the price of a rooftop unit or air handler, and depending on the manufacturer, they can either be installed in the factory or in the field. Carrier, for example, offers a variety of factory- and field-installed economizers and control options to satisfy the needs of most applications, said Chris Opie, director of marketing, Carrier Commercial Systems North America.

“From the most economical field-installed electromechanical economizers to factory-installed, ultra-low leak economizers that are compliant to various FDD requirements, all Carrier economizers are integrated for maximum energy savings and comfort,” he said. “To accommodate the specific requirements of each rooftop unit and its application, they are offered as optional upgrades and priced accordingly.”

Some economizers can be retrofitted into existing equipment or units made by other manufacturers, but it really depends on the manufacturer. At Carrier, economizers can be retrofitted to select older units, including those from other manufacturers, but Opie suggests that installers consult their local Carrier expert, as existing unit controls and cabinet construction can have a large impact on compatibility.

PROPER APPLICATION

The best energy savings opportunities for an economizer are in dry climates, particularly applications that require cooling nearly year round, such as data centers or process applications, said Taylor.

“Climates that are humid will require mechanical cooling to remove the humidity from the outside air entering the building,” he said. “That is why the International Energy Conservation Code (IECC) exempts certain areas from economizer requirements, such as the southern tip of Florida, Hawaii, Guam, Puerto Rico, and the Virgin Islands.”

Using an economizer in humid conditions is often not ideal, as it can lead to discomfort for the building occupants, according to Schlegel. Additionally, it could increase a building’s cooling load in order to counter humidity levels.



VARIETY OF OPTIONS

Carrier Corp. offers a variety of factory- and field-installed economizers and control options to satisfy the needs of most applications.

“As with location, applications will differ in the level of benefit received from the use of an economizer,” he said. “Comfort cooling applications see the benefits of an economizer as the variable cooling load is offset by free cooling, a process that can see even greater energy reductions as favorable outdoor temperatures provide more opportunities for application.”

Even though economizers provide more efficiency when there is less moisture in the air, they can still be used in high-humidity locations, said Dietrich. Because economizers offer greater efficiency with higher load requirements, they can often provide a great deal of energy savings in buildings with large load requirements, such as an arena.

Still, there are certain applications that would not be a good fit for economizers, such as hospitals, which have strict requirements for low space temperatures and humidity. Corrosive ambient environments, such as coastal applications, may also not be a good application for economizers because the gears and dampers can corrode, said Taylor.

“The Aon design is less susceptible to being stuck in position than a damper assembly with linkages, but the aluminum gears and dampers can still corrode in some environments,” he said.

Maintenance is also important, added Taylor, because if the damper is not operating correctly or the sensors are out of calibration, the economizer may not be saving the energy it was designed to save.

“Contractors should always inspect the damper and make sure it is not stuck in position,” he added. “Also, make sure the high-limit temperature and lock-out temperature settings make sense for the environment and application.”

Given that air-side economizers offer such benefits as energy savings and improved IAQ, they should be a part of just about every commercial HVAC design. And thanks to new building codes and standards, they often are. For those owners who do not see the benefits of investing in an economizer, it is likely that they aren’t fully aware of the short- and long-term benefits economizers provide, said Opie. That’s why he urges contractors to make use of the array of tools and literature that many manufacturers offer.

“For example, the Carrier Commercial Invest software generates a quick comparison between different units (up to seven at a time) to show the value and return on investment of various configurations and options, including economizers,” he said.

Showing building owners and managers just how much energy they can save by utilizing an air-side economizer may make the sale just a little bit easier. ■

Device Driven

HVACR manufacturers talk connectivity, shelf life

BY MARIA TAYLOR OF THE NEWS STAFF



DATA ON DEMAND
Data collected by Cooper Atkins' Blue2 device can be exported into an Excel sheet or PDF, then printed and handed to a customer on the spot. This saves time and helps technicians appear more competent, said Patti Ellingson, director of industrial sales.

Smart tools continue to grow in the HVACR industry, spurring manufacturers to create connected, digital devices that will make work in the field less manual and more automatic.

"Technology is key in everyone's business today, so it doesn't matter whether you're a contractor, technician, or just the young millennial coming through high school and into trade school or community college: We are all now device driven," said Patti Ellingson, director of industrial sales - North America for Cooper Atkins, recently acquired by Emerson. "It's a huge transition in the labor force. There's still a manual element, but it all relates back to a comprehensive app: something that is collecting the data, making the job easier."

CONNECTED CONTRACTORS

With so much buzz about the future of automation (think smart homes, self-driving cars, and artificial intelligence), it's important to keep in mind that just as with manual tools, not all smart devices are created equal. The most successful smart HVACR tools have two things that set them apart, said Ellingson: They're easy to use

and have multiple functions.

"Smart tools help us work smarter, not harder, because they're actually able to connect instead of [the user] having to run back and forth" during a project, Ellingson said. "They're outside, and they're hooking up the probes to the refrigerant line or the condensing unit, and then they come inside, and they're adjusting the thermostat. It takes two people, where you're radioing to the guy inside doing spot checks."

Using a device like Cooper Atkins' Blue2 wireless temperature probe, one person can do the job of two.

"The handheld is connected outside; they can come in and still read what's going on through the app, or through data being transmitted through the handheld," Ellingson said.

Data collected via a smart reader can be pushed to the app, the smart device, and the cloud-based system. It can be stored in all three areas — or put to immediate use, which saves time for contractors.

"It can be exported into a CSV file, like an Excel sheet or PDF, and you can print it out and hand that to the customer on the spot," said Ellingson. "Versus in the

past, they'd have to leave it in their truck, go back to the office, take data written down and enter it, then send it to the customer. It makes the technician seem more competent, being able to provide data to the homeowner or property manager."

Smart tools also help increase competency by reducing the need for manual calculations, helping technicians avoid human error.

"You can plug in what refrigerant you're dealing with — 22, 410 — and it's already giving you what your pressure should be," Ellingson said. "The charts are right there at your fingertips, in the app, so you don't have to go to a second location to check temperatures and pressures for the refrigerant, [which introduces the risk of miscalculation]."

Tools like Sporlan's SMART and SMART Pro/R sensors and apps, two lines of Bluetooth-enabled pressure and temperature sensors, provide automatic calculation of superheat and subcool measurements for over 130 refrigerants.

"These tools save time and money on the job by making calculations quicker, reducing steps by showing all sensor data on your mobile device, allowing data sharing with other experts to help solve the problem at hand, and reducing callbacks to the job," said James Ruether, product manager — electronics, Sporlan.

Taking out some of the manual work can also make for heightened safety. That's something that Bacharach is doing via products that measure the combustion and emissions from sources, such as furnaces, boilers, generators, and engines. Their PCA 400, a four-gas, portable combustion analyzer, uses Near-Field Communication (NFC) technology and pre-calibrated B-SMART sensors, eliminating the need to apply any calibration gas, keeping the units in the field and in proper service condition.

"Using a mobile app and Bluetooth connectivity, a technician can place an instrument in an optimal testing location and remotely control and monitor the instrument from a safer or more convenient location," said Harry Ostaffe, director, product management and marketing, Bacharach.

SHELF LIFE

In addition to diagnosing issues with HVACR equipment, smart tools can also diagnose themselves. Ruether believes this will lead to a longer shelf life for the tool.

"We are already seeing more users attracted to tools that can advise the technician they are performing the service properly... in the form of indicator lights, audible tones, mobile app feedback, mechanical interaction," he said. "When tools are intelligent enough to inform the user when something is wrong or it needs calibration, it can prevent unnecessary and unplanned downtime."

In many instances, he added, these tools could be handed down to the next generation of technicians.

Ostaffe put the average shelf life of a smart tool at 10 years or more.

"Embedded processing and wireless capabilities makes it possible to add new features over time, which may further extend the life of the instrument," he said.

Michael Oswald, head of innovation, Refco, agreed.

"We feel the shelf life of smart tools will increase because the tool can help the technician maintain the device accordingly," he said.

Ellingson, on the other hand, said shelf life depends on a number of factors, including how well the devices are cared for physically —



SMART = SAFE

Smart tools like Bacharach's PCA 400 Portable combustion and emissions analyzer, which uses a mobile app and Bluetooth technology, allow technicians to control and monitor testing from a safer or more convenient location.

something a manufacturer ultimately can't control.

"With the old manual tools and test instruments, you could throw it in your bag, and it could take a beating," she said. "With smart tools, it's similar to how you can't leave your cell phone out in the rain... it creates problems. At Cooper Atkins, we've tried to set ourselves apart through a lot of field testing: how waterproof or watertight can we make these handhelds."

That's in response to feedback from technicians who've said they've sometimes forgotten a device outside, only to get home and remember it after a rainstorm hits the area.

"When you start talking about electronics and utilizing them in the field, most smart devices and smart tools are coming with a one-to five-year warranty," Ellingson said.

Five-year warranties are standard, but a lot of smart devices out there are sticking with one-year warranties because of it being electronic, she added.

Like anything digital, smart tools are in a continuous cycle of upgrades. Updates to the app are more frequent; updates to the actual device come when the next generation of the tool is released.

"Most of the updates themselves are done through the app, because what is driving the actual tool itself is predominantly the app," said Ellingson.

She put the typical number of app updates to a smart tool anywhere from one to three times a year, depending on feedback from

SMART TOOLS



AUTO UPDATE

Sporlan's SMART and SMART Pro/R pressure and temperature sensors offer automatic in-app updates, which can add new refrigerants, improve the user interface, and offer new features without having to do anything to the sensors themselves.

the field and changes in the industry: security, a new feature, or a new requirement or parameters in the marketplace — like a new drop in refrigerant.

Software updates can be pushed out through the app that comes with the tool, said Ruether.

“With Sporlan's SMART and SMART Pro/R sensors, the updates are as painless as letting your mobile device automatically update the app,” he said. “These updates can add new refrigerants, improve the user interface, and offer new features without having to do anything to the sensors themselves.”

Cooper Atkins' Blue2 line is currently on its third version of the device; however, the software remains the same.

“With those three versions, each time we improved — it's good, better, best — but they all run on the same app,” Ellingson said. “Anytime there's an upgrade, it's a 50/50: sometimes in-app, sometimes for shape or for ergonomics. What initially set it off from competition was that our probe was interchangeable: You could utilize any type of k-type probe with it... and it used not only the Cooper Atkins app, but allowed, for example, a large chain that does a lot of receiving of produce and food — like Amazon or Walmart — to integrate it within their own existing computer software.”

Version 2.0 added a display to show the readout on the hand-held tool as well as on the device that the data was being pushed to. The latest version includes an infrared laser for speed of receiving and spot-checking products, making the tool more versatile across industries, including food processing and gas and oil.

Ostafte emphasized that with smart tools, it's the software that counts.

“There are occasional, optional firmware updates, but we do not force anyone to upgrade their firmware to use the latest upgrades of the software or the app,” he said.

Upgrades like these are driven largely by feedback from the field, Ellingson added.

“One of the things we do is bring in the folks who actually use the tools,” she said. “You can make what you think is the absolute best smart tool in the industry, but if it doesn't work in the field, they're not going to use it.”

GETTING BUY-IN

Getting HVAC contractors trained and onboard with smart tools is the next hurdle to overcome in the smart tools market, manufacturers



LONG LASTING

Refco's TAP device allows contractors to measure pressure and temperature data from a/c and refrigeration systems, using either a smart device and the Refco app or just the device itself.

agreed. Right now, Oswald said, the field is still manufacturer-driven.

“It is the leading suppliers that are driving the new products into the market,” he said. “The customers' request for IoT products is not as high as in other markets, like for sport activities.”

Part of that is because the labor force is still adjusting; smart tools are still in the early stages of taking over the market, Ellingson said.

“With baby boomers, you're not going to get them to convert to smart tools, regardless of training. They still use a cellphone as a cellphone, not for data collection, pictures... so there's still that need for manual, analog tools.”

New technicians and up-and-coming techs are the ones who will push the market, she said. And while trade shows are one place to offer training, Cooper Atkins focuses more on reaching technicians in the learning environment.

“Marketing-wise, we're going out there and doing hands-on training: doing training videos, NATE [North American Technician Excellence] certification classes, working with educators — really making sure the schools are training up-and-coming technicians in smart tools.”

Online resources can be a big help in training technicians who are “early adopters” of technology, said Ruether. That includes short videos, illustrated instruction sheets, FAQs, and product specifications. Sporlan also offers training sessions through the engineering team that designs its apps, as well as phone and email support.

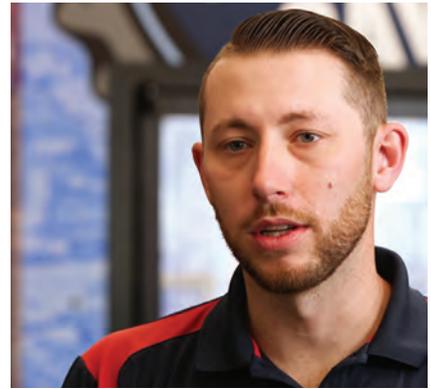
As demand increases, mobile apps and cloud connectivity will continue to be primary drivers in the market, along with features like longer battery life, longer sensor life, and enhancements in data access, Ostafte predicted. Smart tools will also be increasingly able to integrate with third-party software so that customers can use the latest apps in conjunction with their own systems for comprehensive results or readings. While many tools currently use Bluetooth for this purpose, Oswald expects that smart device manufacturers will branch out to other protocols, creating LTE technology-based smart devices that directly connect to a supplier's application in order to update the functionality.

Ellingson said to expect to see a lot more tools becoming “smart” as the market progresses.

“It started with temperature and airflow,” she said. “Now we're starting to see all types of equipment starting to move into smart tools — from scales to refrigerant recovery to pressure differentials to leak detectors. It's just kind of been a domino effect.” ■

ZoomLock® Flame-Free Refrigerant Fittings

C-Store Comparison



How ZoomLock Improved Hinton Refrigeration Company's Bottom Line

"A c-store application that took a crew of 5 guys, 5 days to burn in the pipe the traditional way was cut down on an identical store to 2 guys, 2 days using ZoomLock."

Corey Beck
HINTON REFRIGERATION COMPANY



Customer Profile

Hinton Refrigeration Company was founded in Oklahoma City in 1952 by Argus Hinton. He focused on providing quality grocery store refrigeration installation and service in the Oklahoma City Metro while maintaining integrity and treating customers as family. For over 60 years, the company has grown to become industry experts in refrigeration, commercial HVAC, and residential installation and service while upholding the high quality, integrity and customer service that Mr. Hinton originally instilled in the company.

Today, Hinton Refrigeration continues to strive to excel in the original pillars in which they were founded. They aim to treat employees and customers alike as family to gain life-long customers and to provide the most upstanding service in the Oklahoma City Metro.

Business Challenge

Hinton Refrigeration was awarded two national convenience store installs. On Convenience store #1, Hinton used 5 technicians and five days to weld in the piping using the typical brazing method.

With brazing, the technicians had to constantly bring torches up and down ladders to install the piping on top of the walk-in coolers. They also had to deal with the tight spaces afforded to the convenience store set up. Additional people were needed to keep the valves cool during brazing and watching out for the cooler's white paneling so that they did not burn it while brazing. Once the brazing was done, they would check for leaks and usually found 4-5 pin holes per weld.

Estimated Number of Fittings Used: 80

Solution Overview

On Convenience store #2, Hinton used ZoomLock flame-free refrigerant fittings to install the piping and only 2 technicians and 2 days, cutting the man-hours by 44%. The company was able to train apprentices on the appropriate use of ZoomLock in 15 minutes versus the two-week training needed on proper and safe brazing techniques. They also found that by using ZoomLock, there were no pin hole leaks. The install was quick and fluid. By installing ZoomLock, Hinton Refrigeration was able to save in labor costs and add to their bottom line.

At A Glance

CUSTOMER: Hinton Refrigeration

LOCATION: Oklahoma City, OK

INDUSTRIES:

Shopping Centers, Refrigerated Warehouses, Office Buildings, Schools, Churches, Restaurants, Convenience Stores, Supermarkets

BUSINESS CHALLENGE:

Reduce the costs of a 5,500 sq. ft. convenience store equipment install to increase bottom line

SOLUTION:

Use ZoomLock flame-free refrigerant fittings for installation of tubing connections

COST COMPARISON

BRAZING VS. ZOOMLOCK:

Brazing

Material Cost + Burn Permit	\$743
Labor Cost (200 hrs.)	\$15,600
Labor Cost to Repair Leaks	+ \$468

Total Cost to Braze: \$16,811

ZoomLock

Material Cost	\$2,472
Labor Cost (90 hrs.)	\$7,020
Labor Cost to Repair Leaks	+ \$0

Total Cost to ZoomLock: \$9,492

Overall Savings

Added to Bottom Line: \$7,319



www.zoomlock.com

HELPING YOUR BUSINESS WIN MORE BUSINESS.™

Efficiency Propels Chiller Market

BY NICOLE KRAWCKE OF THE NEWS STAFF



NEXT GENERATION
The York® YZ chiller is fully optimized for performance with a next-generation low-GWP refrigerant: R-1233zd(E). It also uses an integral, variable-speed drive and advanced magnetic bearing technology that features a single moving assembly suspended in a magnetic field that does not require lubrication.

Chillers, much like the rest of the HVAC world, have seen a push to increase operational efficiency. These increasingly energy-efficient products, along with the need to replace aged units, have steadily driven growth in the chiller market. In fact, the global chiller market is projected to reach \$11.33 billion by 2022, growing at a compound annual growth rate of 4.4 percent between 2017 and 2022, according to a report by MarketsandMarkets.

“The chiller market is actually growing, and a lot of it is due to the robust economy we’ve had this past year,” said Bill Dietrich, product general manager, chillers, Daikin Applied Americas. “We’ve seen consistently strong growth in the air-cooled chiller market for the last three years. The water-cooled market had been dropping in size a bit in North America over previous years, but we actually had growth even in the water-cooled market here in 2017. It was a nice indicator of a strong economy.”

Dietrich predicts the air-cooled market will grow at a faster rate and supplant some of the water-cooled part of the chiller market in part due to the progress in the efficiency of air-cooled chillers over the past five years.

“We’ve made some pretty dramatic inroads as an industry into the overall annual efficiency of chillers with things like variable-speed drives, variable volume ratio technology, and different types of condenser fans,”

he said. “So when people start looking at their actual operating costs on an annual basis, in a lot of climates, it may actually be cheaper to run an air-cooled chiller versus a water-cooled chiller. Especially when you start figuring in how much you pay for water. And even outside of that, the maintenance is generally a lot easier on an air-cooled machine, and the installation is typically less expensive as well.”

ALTERNATIVE REFRIGERANTS

In addition to the rise of the air-cooled chiller market, Dietrich said the market is being driven mostly by efficiency, with a close eye on what’s happening with refrigerants.

“People want to know they are getting the right performance and that they are buying something that won’t give them trouble in five to 10 years,” he said. “ASHRAE 90.1 is updated on a regular basis, and it continues to push for higher-efficiency chillers. We’re going to have to do that regardless of the type of refrigerant that goes into the machines.”

Brian Smith, director of global marketing, global chiller products, building technologies & solutions, Johnson Controls Inc., agreed, saying there has been steady growth in the U.S. chiller market. The market continues to see a focus on the environment through improved efficiency at the chiller product level, but there is also momentum with building automation



REDUCING ENERGY COSTS

OptimumEDGE is a software solution that reduces energy costs in water-cooled chilled water systems with up to three chillers and a combined cooling capacity of between 400 and 3,000 tons. The product uses algorithms to reduce energy consumption by an average of 15 to 20 percent.

and system optimization, he noted.

“Energy efficiency continues to be the primary driver,” Smith said. “There is also a lot of press coverage about alternate refrigerants. In 2016, we committed to provide long-term solutions for our R-134a-based products, as there was some uncertainty around what was going to happen with refrigerants in the U.S. and globally. This year, we launched a completely optimized design, the York YZ magnetic bearing centrifugal chiller.

“As it relates to energy efficiency and refrigerants, absorption chillers have always been great economic and environmental technologies for buildings,” he continued. “They use water as the refrigerant and can use waste energy as a primary energy source. In the U.S. market, absorption has followed cycles in the energy sector, but the coincidence of pressures on climate change, energy security, energy costs, and reduction of waste energy — this could be the perfect opportunity for absorption to take off.”

Smith added that Europe, which tends to be ahead of other regions in taking action on refrigerants, has seen some interesting dynamics in the smaller capacity segment where chilled water systems compete with VRF systems.

“Growing concerns over the lack of non-flammable, low-GWP alternative refrigerants for R-410A for VRF systems has created opportunities for smaller chilled water systems,” he noted.

MULTIPURPOSE

The market is also seeing strong growth in modular chillers, particularly for heat recovery, heat pump designs, and chillers that are multi-purposed for both heating and cooling, according to Rich Lancaster, president, ClimaCool Corp.

“Having multiple modes of operation in the same unit or chiller bank offers owners several advantages,” Lancaster said. “First, the compact size of multi-mode units takes up significantly less space in a mechanical room than a separate boiler and standard chiller. Secondly, compact modular units are easier to install, since they can fit through a standard double door and in a typical service elevator. This ease of installation is an important factor in a market where units for replacement and modernization are still larger than the new construction market. And lastly, multiple modes of operation mean the same unit can precisely match the changing load requirements throughout a day, a week, or the seasons of the year.”

ClimaCool is thrilled to see interest in its heat pump and heat

recovery chiller options, Lancaster noted, saying that heat recovery allows owners to use energy they would have otherwise thrown away for domestic hot water or heating requirements.

“Heat pump systems continue to be popular choices, especially for K-12 schools and commercial offices, due to their high efficiency and low utility costs,” he said. “We’ve seen a growth in our dedicated outdoor air systems (DOAS) to provide the ASHRAE recommended outdoor air for heat pump systems.”

ASHRAE guidelines, which recommend the use of heat recovery whenever possible, are a big influencer, Lancaster explained. Economics also continues to be a trend as more owners and system designers are realizing the financial benefits of heat recovery. Additionally, certain state and local municipalities have enhanced their energy codes to require systems be increasingly more efficient.

“The need to avoid downtime in critical facilities, like health care, high-tech manufacturing, and education, is driving the demand for redundant systems,” Lancaster added. “With modular chillers in a bank, if one unit fails, the other modules continue to operate and provide cooling or heating for critical temperature control.”

Government, institutions, and major commercial corporations also focus on building or modernizing their facilities to include sustainable systems in order to save money and attract the next generation of employees.

“The trend toward zero energy for all buildings is driving chiller designs to do more than just provide chilled water; they need to be able to achieve the energy efficiency, redundancy, and flexibility required by today’s high-performance mechanical systems,” Lancaster said.



OPTIMAL FUNCTION

ClimaCool® simultaneous heating and cooling (SHC) chillers provide heating, cooling, heat recovery, and heat pump technology in each module. This functionality eliminates the need to have separate equipment for heating and cooling, which can reduce equipment capital costs as well as installation time.



OPTIMIZED PERFORMANCE
Daikin Applied's Pathfinder features a flexible design and is 100 percent configurable. Pathfinder's performance is optimized for every condition and at every hour of the day with Daikin's unique Variable Volume Ratio (VVR) compressor technology.

OPTIMIZATION

Optimum Energy LLC is seeing growth in the market as its clients replace older chillers with new, more efficient products, according to Ian Dempster, senior director, product innovation, Optimum Energy.

"Putting in an efficient chiller is a great move, but you really want to be focused on optimizing the entire HVAC system," Dempster said. "For us as a company, we've been looking at the chillers, the pieces of equipment associated with them, and how these facilities use cooling for over 10 years now. Our product, OptimumEDGE, focuses on not only running the chiller efficiently, but on running the whole chiller system or chiller plant more efficiently. I really see a lot of people now focusing on optimizing their whole chiller system versus just installing and running efficient equipment. We've seen good results on getting efficient equipment running in buildings and actually having control intelligence on top of that to ensure these systems are operating as efficiently as possible at all times."

Dempster added that over the past five years, a lot of focus has been on making air-cooled chillers more efficient in order to conserve water resources due to the concern about water shortages around the world.

"Obviously, air-cooled chillers allow the chilled water system to operate with less water," he explained. "You're not going to be evaporating water from cooling towers as you do with a standard centrifugal water-cooled chiller plant. Another factor is many cities are putting out requirements in the form of codes and more modern equipment in buildings. With the visualization of different systems around water and energy, seeing the amount of energy used for air conditioning and cooling, people are realizing there are technologies out there that can reduce that usage."

WHAT'S NEXT

As the market continues to grow and advance, owners will

continue to build new facilities, targeting net-zero energy and incorporating a variety of construction components and renewable energy, like solar photovoltaic (PV) panels and high-performance mechanical systems, Lancaster said.

"Owners are planning long term to counteract the effects of steadily rising energy costs and to become energy independent," he said. "Redundancy will continue to grow as everyone wants to avoid downtime, not just in critical facilities, but also in buildings that feel economic effects, like the hospitality and retail industries."

Dietrich predicts the market will start to see a shift in refrigerants over the next five years, along with continued growth on the air-cooled chiller side.

"People are a little more adverse to the maintenance associated with the water-cooled systems, so we'll continue to see the air-cooled part of the market get stronger, especially with the products under 500 ton," he said. "We're also anticipating some of the model building codes will start to recognize the lower flammability refrigerants around 2021. That will be the first opportunity to see some of the R-410A alternatives out in the market."

Smith anticipates that growth of chiller equipment using alternative refrigerants will take place slowly over time, as equipment and component manufacturers optimize new designs for new fluids.

"We see continued use of today's offerings that are highly optimized and energy efficient," he said. "If the costs for new refrigerants were to drop, then the growth of alternative refrigerants could accelerate. And while we're seeing growth in nearly all sectors, we do anticipate potential renewed interest in absorption chillers and heat pumps due to their use of waste energy and potentially other forms of heat recovery and heat pumps. Absorption, heat pumps, and heat-recovery technologies represent significant savings in energy consumption and reductions in fossil fuel dependence and its associated emissions." ■



THIS IS A SMALLER FOOTPRINT

*Modulating 3-Way Valve
Type MTW-9 and MTW-17*

*Simplified system piping
Reduces control and wiring complexity
Reduced install time*

The MTW's two outlet ports allows control of refrigerant flow typically located in the discharge line for dehumidification, reheat and heat reclaim applications. This reflects Parker's commitment to solving the world's greatest engineering challenges.

sporlan.com



ENGINEERING YOUR SUCCESS.

Optimizing Commercial Boiler Systems

BY JOANNA TURPIN OF THE NEWS STAFF



OPTIMIZED BOILERS
Often the simplest way to optimize energy efficiency in condensing boilers is to lower the return water temperature to the point the system is operating in condensing mode. Courtesy, Cleaver Brooks

According to the U.S. Energy Information Administration, heating accounts for roughly one-third of the total energy consumption in U.S. commercial buildings, with boilers supplying heat to about 33 percent of total floor space. Keeping these boilers operating at peak performance is the goal of most commercial building owners and managers, who typically want to minimize energy costs and maximize comfort.

Regular maintenance is crucial, of course, to ensuring boilers keep operating as efficiently as possible, but there are ways to optimize their performance. Installing variable-speed pumps, lowering the return water temperature, and keeping the system free from impurities are just a few of the ways to improve efficiency. And when combined with brand-new condensing boilers, commercial owners and managers can expect to see even greater energy savings – and comfort.

TOTAL SOLUTION

One of the best ways to improve energy efficiency in an existing commercial boiler system is to replace the existing boiler plant with new, highly efficient, modulating condensing gas boilers coupled with electronically commutated motor (ECM), variable, primary boiler pumps, said John M. Packer, president and chief operating officer, FIA Inc., a manufacturer's representative for Bell & Gossett. That's because modulating condensing

gas boilers are capable of supply water temperature reset to match the building load and deep part-load operation (turndown) and can include variable-speed primary boiler pumps.

"Smart ECM pumps like Bell & Gossett's Ecocirc XL leverage intelligent controls and communication capabilities like proactive self-monitoring, reducing system downtime for maximum efficiency and lower operational costs," said Packer. "This is a new twist on traditional primary/secondary applications. Variable-speed boiler pumps match production with load, keeping boiler return temperatures low and boiler efficiency high, while the condensing operation is maximized. ROI [return on investment] can be realized quickly when utility rebates and improved plant operations are considered. In fact, FIA had one property management customer that experienced ROI less than one year after making improvements to the building's boiler system."

Nate Warren, business development manager of specialty products, Bradford White Corp., agreed there is a strong case to be made for replacing older, less efficient boilers with modulating condensing boilers.

"Modulating the boiler output to match the heating needs can improve the comfort and efficiency of the heating system," he said. "In most cases, these condensing boilers can be equipped with onboard variable-speed pump controls that make it easier for contractors to integrate variable-speed boiler pumps and provide additional boiler and electrical efficiencies."

Some building owners may be reluctant to replace an aging boiler system before it fails, added Warren. However, the combined energy efficiencies of condensing boilers with integrated variable-speed pump controls can greatly reduce utility and operating costs, which helps justify the investment well before the existing system fails.

For buildings that already have condensing boilers installed, often the simplest way to optimize energy efficiency is to lower the return water temperature back to the boilers to the point the system is operating in condensing mode (return water temperatures below 130°F), said Catie VanWormer, product sales manager of ClearFire® boilers, Cleaver-Brooks Inc.

"This often means lowering the supply temperature year-round or implementing supply temperature reset, which can help improve boiler operating efficiency in the shoulder seasons when higher temperatures are not necessary to heat the space," she said.

MEET ZOOMLOCK®

COMPATIBLE COMPONENTS



ZoomLock
ZoomLock

**HVACR COMPONENTS
FOR ZOOMLOCK FLAME-FREE FITTINGS**

- ▶ ODM X ODM connections for easy 10-second installation.
- ▶ 40-60% time and cost savings per job.
- ▶ No brazing. No flame. No fire spotter.
- ▶ Available where you find ZoomLock.



www.zoomlock.com



LABOR AND TIME SAVING SOLUTIONS –
HELPING YOUR BUSINESS WIN MORE BUSINESS.™



HYDRONICS UPGRADE

Indeed, where condensing boilers are concerned, return water temperature is one of the most important parameters for efficiency and energy savings, said Kyle Bottorff, product manager, Fulton Heating Solutions.

“Installing a VFD [variable frequency drive] pump to open up the delta-T across the boiler will help lower return water temperatures, thereby increasing thermal efficiency and condensing potential,” he said. “Additionally, better control systems designed specifically for condensing boilers can stage boilers more effectively for additional utility savings and less wasted energy by reducing the number of purge cycles.”

“We see refurbishment picking up, but these projects are much more likely to use VRF instead,” said Holley. “This year, we are expecting a drop in the chiller market of about 3 percent, but, again, a lot of the drop is due to the Chinese market, which comprises 45 percent of the chiller market. The U.S. is the second biggest global chiller market, with just more than \$1 billion in sales. That market is doing fairly well, and an annual growth rate of 5 percent is expected through 2020.”

In summary, BSRIA expects the global air conditioning market to be slightly down this year, but that may change due to improving conditions in China. VRF sales will continue to be strong everywhere, but whether Asian-style products continue to do well in the U.S. may depend on if trade barriers are implemented.

“Overall, during the next three years, growth is expected from the U.S. and Southeast Asia while the Chinese market will continue to struggle,” said Holley.

COST-EFFECTIVE UPGRADES

If total replacement is not an option and a building’s mid-efficiency boilers are still in good shape, then adding even one modulating condensing boiler can help reduce operating expenses over time, said Chuck O’Donnell, director of marketing, Laars Heating Systems.

“These hybrid systems operate the modulating condensing boiler first when there’s a call for heat, which allows for the majority of the heating load to be satisfied by the most efficient boiler,” he said. “The mid-efficiency boilers come online only during the coldest days of the



CONSTANT CONDITIONS

Self-sensing pumps can help improve efficiency by responding to the demands of the system and delivering a constant temperature differential across the boiler(s) at variable flows. *Courtesy, Taco*

year. By installing a hybrid system, building owners can save money on upfront installation costs and still enjoy much of the savings of a complete modulating condensing boiler system.”

Other ways to improve the efficiency of an existing boiler can include burner retrofits or controls upgrades as well as changing lead/lag staging parameters to help minimize excessive cycling, noted VanWormer.

“Implementing variable-speed pumping, either by adding variable-speed drives to existing pumps or replacing pumps, can also reduce pumping energy consumption as well as help to maintain the design delta-T,” she said.

The power consumed by pumps can be substantial, which is why variable-speed pumping is becoming so popular, according to O’Donnell.

“Variable-speed drives, such as Laars Heating Systems’ Vari-Prime, which can be used with MagnaTherm and NeoTherm condensing boilers, match a variable-speed pump’s flow rate with that of the boiler’s modulation rate,” he said. “When the boiler modulates down, so will the variable-speed pump. Over time, this can significantly reduce a building owner’s electrical bills.”

Variable-speed pumps with integrated controls, such as Grundfos’s Magna3 unit, which uses an ECM motor and has built-in control functions designed specifically for variable load heating loop applications, can significantly reduce energy consumption, said Michael Madsen, district sales manager, Grundfos Pumps Corp.



JUST ADD ONE

If total replacement is not an option and a building’s boilers are still in good shape, then adding even one modulating condensing boiler can help reduce operating expenses over time. *Courtesy, Laars Heating Systems*



GOOD ARGUMENT

Some building owners may be reluctant to replace a boiler system before it fails, but the efficiencies of condensing boilers with variable-speed pump controls can help justify the investment. *Courtesy, Bradford White*

“An ECM motor is more efficient than a conventional motor, and typical energy savings of 25-35 percent can be obtained with this improvement alone,” he added.

The Magna3 has several built-in control modes that will adjust the pump’s performance based on the load in the system, explained Madsen.

“For example, as more radiators are calling for heating water, the pump will automatically pump more, and when fewer are calling for heating water, it will pump less,” he said. “The unit’s control mode, Auto Adapt, allows it to automatically adjust to actual system conditions and optimize performance and energy savings.”

Self-sensing pumps are another option that building owners and managers should consider when looking to improve efficiency, said Richard Medairos, senior systems engineer and trainer, Taco Comfort Solutions.

“Self-sensing pumps respond to the demands of the system and can be configured to deliver a constant temperature differential across the boiler(s) at variable flows,” he said. “This is an advantage, because it ensures that the boiler operates at its highest efficiency.”

Self-sensing pumps can be used in both constant and variable-flow systems, explained Medairos. In a constant-flow configuration, these pumps can accurately deliver precise flow to each boiler in the system, while in variable-flow configurations, they provide consistent variable flow, or variable primary flow, ensuring a match between boiler capacity and system load. In an existing constant flow configuration, the ROI of a self-sensing pump can be realized within one or two years.

Several major pump manufacturers offer self-sensing pumps with integrated VFDs, said Medairos. These pumps do not require sensors to be installed in the pipes and come with the VFD factory tuned to that specific pump and preprogrammed for sensorless variable flow pumping.

“Quite literally, these pumps need only be installed and activated,” he said. “They’re programmed to sense what flow is needed, and they provide it immediately.”



BOILER INSTALL

Technicians from Rymes Propane & Oil, Concord, New Hampshire, complete commissioning of a light commercial Laars NeoTherm boiler installation at Shoals Marine Laboratory on Appledore Island, NH.



ATTRACTIVE FILTERS

Adey’s MagnaClean filters use very strong magnetic cores to collect and retain damaging sludge without causing pressure drop.

TOTAL SOLUTION

Of course, peak performance starts with a clean boiler, and regular planned maintenance as outlined by the manufacturer will help ensure boiler systems remain clean and operating as designed, said Packer.

“Boiler systems should be kept free of oil and other impurities, which can cause short cycling and wet steam and waste energy,” he said. “Basic recordkeeping is also essential, and contractors should keep a preventive maintenance log to evaluate system performance and spot trends that may be affecting boiler operation. This sets a baseline for later maintenance and service calls.”

Keeping the boiler free from impurities involves proper water treatment, which usually consists of chemical inhibitors combined with some kind of mechanical filtration. Taco air separators, for example, remove air and dirt from the system to prevent problems, such as reduced heat transfer, loss of efficiency, pipe corrosion, pump damage, noise, and increased energy consumption. “Within the air separator enclosure, water moves through pall rings to cleanse the fluid of microbubbles, sand, dirt, and rust,” said Medairos.

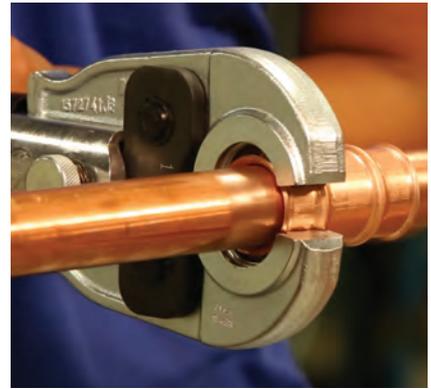
Where hydronic heating systems utilize iron pipe, scale and iron oxide sludge (magnetite) make up most of the system debris. Because of its small particle size, magnetite can be very damaging to system components, such as ECM pumps and heat exchangers. Magnetite can accumulate in low-flow areas, forming a sludge and combining with scale to create a hard enamel-like coating on the inside of pipework and the heat exchangers.

“This can lead to expensive failures due to overheating and blocked water ways as well as causing a significant reduction in boiler efficiency,” said Tom Tonkins, director of US business development, Adey Professional Heating Solutions.

Adey’s range of MagnaClean Commercial dirt filters utilize strong rare earth magnets to collect and retain damaging sludge consisting of magnetite and scale, regardless of particle size. “MagnaClean can boost system efficiency by up to 30 percent, greatly improving performance and restoring equipment back to its original ratings,” said Tonkins. “And while ROI will depend on the condition of each system, in general, payback — including the cost of installation — should be achievable within six to eight months.”

As can be seen, there are numerous ways in which boilers can be optimized to increase efficiency and comfort. Many of these upgrades are relatively easy to implement, and they are not costly, which should make them attractive to commercial building owners and managers who are looking for ways to reduce operating costs. ■

ZoomLock® Flame-Free Refrigerant Fittings Impacts the Bottom Line



How ZoomLock Improved Dakota Refrigeration, Inc.'s Bottom Line

"We can complete the job faster, with no torch, solder or fire extinguishers, no leaks and use less experienced techs to complete the piping project. The fittings cost a little more than standard fittings, but the time savings makes up the difference."

Mike Kempel
President
DAKOTA REFRIGERATION, INC



Customer Profile

Founded in 1974, Dakota Refrigeration, Inc. provides North Dakota, Northern South Dakota, West Central Minnesota, and Eastern Montana with food service equipment as well as refrigeration, heating, ventilation, and commercial air conditioning services. Dakota Refrigeration's capabilities cover design and installation, to maintenance and repair.

Business Challenge

Dakota Refrigeration's large service area can result in lengthy travel time to the job-site. Mike's team was challenged with a refrigeration equipment install 200 miles from the shop. This means incurring additional costs for weekly drive time, employee lodging and daily allowances.

The refrigeration system for the 25,000 sq. ft. store was designed for use with R-449A. It included numerous medium and low temperature glass door merchandisers, 1 open meat case (6' in length) and 4 island freezers / dual temperature cases.

The refrigeration piping design specified standard circuit piping, incorporating 1 liquid pipe and 1 suction pipe per circuit. No loop piping was used.

Labor Requirements:

- 2 foremen, 2 apprentices
- 50-hour work week (includes 10 hours of overtime)
- Pay for weekly drive time (200 miles)
- Lodging and per diem per employee

Blended Rate for Job:

\$202/hour regular pay
\$303/hour overtime (x 1.5)

Estimated Number of Fittings Used:

870

Solution Overview

Dakota Refrigeration wanted to increase their bottom line and to do that, they needed to find a way to decrease labor costs which lead them to ZoomLock. HVACR contractors have had to rely on brazing as the way to join copper tubing and fittings for refrigerant lines. And, brazing requires highly trained, highly paid technicians; fire permits; fire spotters; brazing tools and gases; nitrogen purging; and more. With a

At A Glance

CUSTOMER: Dakota Refrigeration, Inc.

LOCATION: Fargo, North Dakota

INDUSTRIES:

Supermarket Equipment, Refrigeration, Heating, Ventilation, and Air Conditioning Services

BUSINESS CHALLENGE:

Reduce costs of 25,000 sq. ft. store equipment install to increase bottom line

SOLUTION:

Use ZoomLock flame-free refrigerant fittings for installation of tube connections

RESULTS:

2 Weeks Labor Cost Savings:
(\$11,110 Per Week X 2) \$22,220

Other Estimated Cost Savings
(Lodging, Mileage, Per Diem):+ \$1,776

Total Estimated Labor and Other Cost Savings: \$23,996

ZoomLock vs. Brazed Fittings Cost Difference: - \$11,655

Overall Savings Added to Bottom Line: \$12,341

reported 40-60% reduction in time and labor costs on tubing connections, using ZoomLock made sense. By installing ZoomLock, Dakota Refrigeration was able to save 2 weeks in labor costs.



www.zoomlock.com

HELPING YOUR BUSINESS WIN MORE BUSINESS.™

You need strategic partners. We know where to find them.

Join the industry's largest design-build contractors & leading manufacturers at MechanicalXchange 2019 for private, executive-level meetings centered around long-term business growth & strategic partnership development.

MECHANICALXCHANGE 2018 MANUFACTURER PARTNERS



"I was asked to compare MX to other industry events and my answer was, 'there is no comparison!'"

KEITH GLASCH, PRESIDENT FOR RUSKIN

"I know attending MX puts literally months back on my calendar; the process of MX setting up these meetings, customizing my meetings & taking care of all of the logistics is priceless."

TODD FOLLIS, SENIOR EXECUTIVE FOR JOHN W. DANFORTH COMPANY



September 29 – October 2, 2019 | www.verticalxchange.com/mechanicalxchange

MEET ZOOMLOCK®

FLAME-FREE REFRIGERANT FITTINGS

**KLAUKE®
RIDGID® &
MILWAUKEE®
COMPATIBLE
JAWS**

10 SECONDS. CONNECTED.

- ▶ No brazing. No flame.
- ▶ No hot work permit.
- ▶ No fire watch required.
- ▶ 40-60% time and cost savings per job.



zoomlock.com

HELPING YOUR BUSINESS WIN **MORE BUSINESS™**



ZOOMLOCK FLAME-FREE REFRIGERANT FITTINGS CHANGE EVERYTHING.

“It takes steps out of your traditional install of a VRF system or any traditional AC/R system and **time is key...**”



»» **DAVE WILSON**
Breen & Sullivan Mechanical Services, Inc.

50+ REFRIGERANTS
APPROVED FOR ZOOMLOCK

