

SMART SOLUTIONS

WINTER 2017

Helping contractors save money and enhance productivity

Smooth Sailing for Seattle's Floating Bridge Thanks to Anvil Products

Diamond B Constructors Completes Complex Rainwater Management Systems with Anvil's American-Made Flexible Couplings and Fittings

For Seattle's new State Route 520 Evergreen Point Floating Bridge, **Diamond B Constructors, Inc.** knew they could count on **Anvil International** for flexible couplings and fittings for the Schedule 40 pipe of the bridge's wastewater removal system. In addition, because Anvil's products used on this project were manufactured in its U.S. plants, they satisfied the requirements of the Federal Highway Administration for American-made construction supplies.

Replacing the World's Largest Floating Bridge

Completed in 2016, the new bridge is the longest floating bridge in the world. Spanning Lake Washington and connecting Seattle on the western side of the lake to Medina

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Anvil products played a critical role in helping Diamond B complete the wastewater removal system of the new State Route 520 Floating Bridge (right) that protects Lake Washington from the runoff. The new bridge opened in April 2016 and replaced the former bridge (left), which was completed in 1963.

Western Mechanical Cuts Days Off Complex Restoration with Victaulic Project Management

Victaulic's 3D Scanning Technology Enables Modeling of 100-Year-Old Detroit News Building

Victaulic's project management, coordination, and new 3D scanning technology allowed **Western Mechanical Contractors, Inc.**

to cut days off the schedule for a historic building renovation, cutting labor costs and keeping the project on time and within budget. The 100-year-old Detroit News Building in downtown Detroit, MI, posed several challenges to restoration—including one tenant who remained in the building throughout the project.

In 2014, Bedrock Real Estate Services, a commercial real estate development firm owned by Dan Gilbert, founder of Quicken Loans, decided to buy the nearly vacant building. The developer wanted to restore the building by retrofitting it with new mechanical, electrical, and plumbing systems in hopes of attracting new long-term tenants.

Michigan-based Western Mechanical engaged Victaulic because they had seen Victaulic's technologies and solutions firsthand on other projects. "Victaulic was originally brought into the mix because of its track record of



The building's boiler system, mechanical spaces, and hydronics are located primarily on the uppermost floors—with no elevator access. Thanks to the Victaulic CPS team's modeling, spool sheets, and bagging and tagging services, Western Mechanical cut three days off the time estimated to transport materials to the higher floors.

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MANUFACTURER / SUPPLIER COUNCIL
MCAA
Adding Value to Your Supply Chain

SMART SOLUTIONS

Helping contractors save money
and enhance productivity

Smart Solutions showcases new technologies and promotes cost-saving and productivity-enhancing applications available from members of MCAA's Manufacturer/Supplier Council. *Smart Solutions* is published biannually for contractor members of MCAA and its subsidiaries.

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MANUFACTURER / SUPPLIER COUNCIL

MCAA

Adding Value to Your Supply Chain



Meeting the Market's Unique Demands

This issue of *Smart Solutions* demonstrates that contractors can stay profitable and still meet the complex and changing demands of their clients by relying on forward-looking products from MCAA's Supplier Partners. Seattle's new floating bridge—the longest in the world—is a marvel of modern technology that Diamond B Constructors, Inc. helped build, using American-made Anvil products to satisfy purchasing requirements and the unique needs of a floating roadway over an ecologically sensitive lake.

Tasked with fixing a refrigerant line leak in a computer room, Davis Mechanical Service, Inc. found Parker-Hannifin's ZoomLock™ Braze-Free Fittings ideal in a setting where using a torch was a poor option. Rawal's APR Control was the perfect fix for a mixed-use facility seeing the effects of hot weather, high humidity, and fluctuating attendance on an overtaxed air conditioning system. Lightweight, environmentally friendly Aquatherm pipe systems fit the bill for a school expansion project and helped John E. Green Co. decrease its installation time. Using Miller's all-in-one PipeWorx 400 welding system, Team Industries is improving consistency of welds—saving time and money—while also maximizing shop space. Daikin's energy-efficient chillers achieved comfort for an apartment building's tenants and generated a healthy energy rebate for its owners.

Supplier Partners are also coming up with new ways to help you streamline business practices with new technology. For example:

- KEY2ACT partnered with MacDonald-Miller Facility Solutions on new software that lets contractors use smart glasses to capture photos and videos of their work onsite, which has already helped speed up customer payment and dramatically cut down on disputed charges.
- Employing Victaulic's project management, coordination, and new 3D scanning technology allowed Western Mechanical Contractors, Inc. to cut days off the schedule for a historic building renovation.
- T.H. Eifert Mechanical Contractors saw a sizable, and rapid return on investment thank to the BuildingAdvice Energy Services Delivery platform, generating over \$400,000 in new preventive maintenance contracts and pull-through sales.
- L.J. Kruse Co. found that going digital with iBusiness Technologies' MobiliForms paid off rapidly by saving time and eliminating errors.

Join me in welcoming our newest supplier partners:

- **Armstrong Pumps, Inc.**
- **eSUB Construction Software**
- **FotoIN Mobile Corporation**
- **Guardian Fall Protection**
- **Honeywell Environmental & Energy Solutions**
- **United Rentals, Inc.**

MCAA's focus on education is especially strong in this issue. Appion explains how to streamline the time-consuming process of refrigerant recovery, while Honeywell offers advice on retrofitting air conditioning systems with less hassle. You will find detailed practical suggestions on safe material handling from trusted industry voice CNA. You will also learn about new commercial HVAC regulations, thanks to Emerson.

Our Supplier Partners are always on your side when it comes to making your business better. You can visit them in person at *MCAA 2017*.

Bill Tavenner, Chairman

Apartment Complex Boosts Energy Efficiency by 20 Percent with Daikin Chillers

Owners Earn \$62,000 Rebate from City Utility

Owners of a Washington, DC, apartment complex undergoing renovation selected **Daikin** products for their reliability and energy-saving potential. The choice not only improved comfort and energy efficiency in the buildings but also netted a \$62,000 rebate from the local electric utility, enhancing the owners' return on investment.

The renovation involved 648 apartments in three 1960s-era buildings at Capitol Park Plaza and Twins in southwest Washington, DC. At nearly 20 years old, the four screw chillers serving the complex were near failure and no longer providing redundancy. "When looking at capital improvements, my goal is to try to maximize return through savings," said Brian Wilson, owner with Capitol Park Apartments LP in Middleburg, VA. "I needed research. In looking at who did what, it became clear Daikin had our solution with its magnetic bearing technology."

Analysis Aids Decision

Sean O'Brien, district service manager with Daikin, explained that Daikin offered the owners a

complimentary in-depth energy study of the buildings. Panda Aumpansub, P.E., a Daikin representative energy performance engineer in Columbia, MD, conducted the analysis. "Her study gave owners an accurate view of the energy consumption and load requirements at Capitol Park with a lifecycle cost analysis on the proposed replacement equipment," O'Brien said. Owners also moved forward with other energy-related improvements, such as lighting retrofits.

As an owner, Wilson appreciated touring the Daikin factory in Staunton, VA. "The entire Daikin organization is first-class, and it was validating to see the production of the chillers. Daikin has far and away the best technology, but also probably is the best organized group of people I've ever worked with," he said.

"The entire Daikin organization is first-class, and it was validating to see the production of the chillers. Daikin has far and away the best technology..."

—Brian Wilson, Owner, Capitol Park Apartments



Thanks to an upgrade to Daikin chillers, residents of the 1960s-era buildings at Capitol Park Plaza and Twins in southwest Washington, DC, got more comfortable, energy-efficient apartments and owners received a \$62,000 rebate from the local electrical utility.

Wilson was impressed with the digitally controlled magnetic bearing system on the chiller compressors, which reduces maintenance costs. He also knew the variable frequency drives (VFDs) on the chiller's dual compressors would contribute to significant energy savings over standard centrifugal chillers.

For example, the two Magnitude chillers in the Plaza building can communicate with each other, so only one compressor on each of the chillers needs to be operated. The system can also easily be adjusted to meet the reduced demands of unoccupied spaces in the apartments during the day because of the VFDs.

Daikin Service Group provided installation and start-up of the chillers and air handlers, beginning in November 2014 and working in

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Left: Daikin Magnitude chillers maximized the return on investment through energy savings and utility rebates for the Washington, DC, apartment complex.



Right: Installers overcame the challenge of limited access to a lower-level mechanical room with carefully planned coordination.

Parker Hannifin's ZoomLock Braze-Free Fittings Allow Davis Mechanical to Fix Refrigerant Line Leak Fast

To repair a refrigerant leak in the computer room of an office tower tenant, **Davis Mechanical Service, Inc.** turned to **Parker Hannifin Corporation's** ZoomLock™ Braze-Free Fittings, avoiding the need to use a torch or get a burn permit. As a result, Davis Mechanical completed the whole repair in less than an hour and with minimal disruption to the client.

No Time for Downtime

The AXA Towers are among the tallest buildings in Syracuse, NY, and have been iconic fixtures in the city's skyline since Tower II's completion in 1973. Recently, one of the AXA Towers' tenants experienced a R-410A refrigerant liquid line leak in their computer room's variable refrigerant flow (VRF) system, caused by aging joints coming apart. Originally, these lines were held together with a complex, expensive glue and a pinching press that has, over time, started to loosen.

Keeping servers online and accessible is crucial to a company's operations. Thus, the tenant required immediate assistance to patch the leak. With the leak's proximity to their computer system and data center, conventional brazing was out of the question.

"We had to do it in such a manner that caused minimal disruption and maintained cool temperatures," said Davis Mechanical President Chris Geatrakas. "And because of the location of the leak, we could not easily bring in a brazing torch to repair the leak in a conventional manner." A portable temporary air conditioning unit was set in place to maintain temperatures as repairs were performed.

Fast and Fire-Free

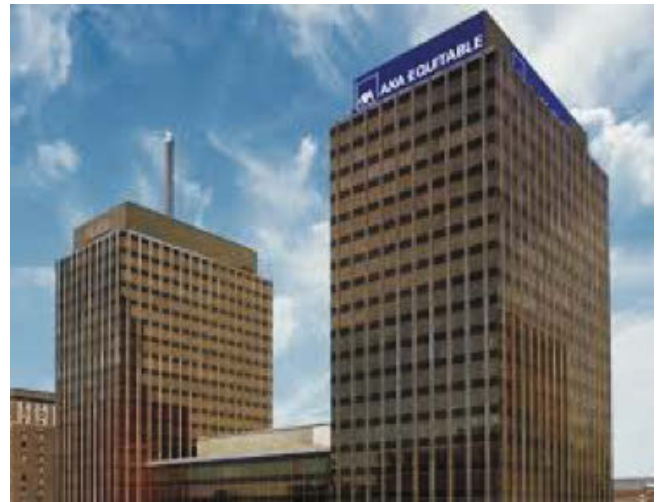
To tackle these challenges, Davis Mechanical employed ZoomLock Braze-Free Fittings. ZoomLock's innovative design features a crimping tool to join copper tubes without brazing equipment. Also, ZoomLock fittings are leak-proof, and workers can repeat the joining process faster with ZoomLock than with brazing.

By avoiding brazing tools with ZoomLock, Davis Mechanical was able to make the necessary repairs without having to acquire a burn permit, disable the building's fire suppression systems, or hire a firewatcher during the job.

"We removed the refrigerant from the line, cut the line, cut the bad piece out, and ZoomLock-repaired the leaking line in a very short time," Geatrakas said. "We evacuated the system of air, opened valves up, and got them up and running in less than an hour."

A study by Jay Peters, principal advisor of Codes and Standards International, compared the time required to join refrigeration tube of various sizes by brazing to the time required to join identical copper tubing with ZoomLock fittings. Using ZoomLock saved time at each size; joining went from 31 percent faster with the smallest fittings to 77 percent faster with the largest fittings. While the time needed for traditional brazing increased with

each size by a significant margin—35 seconds for 1/4", 42 seconds for 5/8", and 75 seconds for 1 1/8"—the difference in installation time between ZoomLock's smallest fitting and largest fitting was just one second—24 seconds at 1/4" and 25 seconds at 1 1/8". And most importantly for Davis Mechanical's needs, ZoomLock requires no torch, making it a perfect fit for the job and more efficient than traditional solutions.



Davis Mechanical used Parker Hannifin Corporation's ZoomLock Braze-Free Fittings to fix a refrigerant leak in an AXA Tower computer room in less than an hour, avoiding the need to use a torch or get a burn permit.

The quick, torch-free installation of ZoomLock fittings saved time for Davis Mechanical and ensured that they would not compromise computer systems in the affected area. "No lost data, no lost downtime," Geatrakas noted. "It made our work much easier, cost the customer less, and made us look good."

For more information, visit www.zoomlock.com. MCAA thanks Parker for being a supporter of MCAA 2017.

CNA Provides Tips for Mitigating Material Handling Risks on Construction Sites

Manual material handling is the largest single cause of lost workday injuries in construction. One out of every four work injuries happens because someone lifted, carried, pushed, or pulled something the wrong way or lifted beyond his or her capacity.

Workers should be trained on proper and safe material handling techniques either manually or by using mechanical means. The use of correct handling techniques is one of the ways to help reduce injuries.

Injuries

The most useful part of your body in handling materials safely is not your back or legs, but your head. Untrained workers often do the job the hard way and soon get tired, which leads to possible injury. The following are some key potential injury areas that can occur when material is improperly handled.

Back Pain

Back pain, especially low back pain, is second only to colds and other respiratory problems as the leading cause of lost time on the job. Many workers suffer from low back pain, much of which results from improper handling of materials.

Fatigue is the most common cause of back pain, resulting from doing heavy, repetitive jobs for an extended period of time with the body in an unnatural position. It also can result from light jobs where the body is not in a normal position, such as bending over a low bench or desk. A short warm-up session before beginning a heavy task and occasional stretch breaks can help avoid fatigue.

Sudden, acute pain from a muscular strain may often be easily treated.

Don't ignore any form of back pain. Seek medical advice and treatment as soon as possible.

Hernia

A hernia is caused by a weakness in the abdominal wall which ruptures, pushing a part of the abdominal contents through the wall, causing a bulge or lump. While most common in males, women too may suffer hernias. Hernias do not only affect workers in heavy industry, as most think. Any weakness in the abdominal wall is susceptible to a hernia when unsafe lifting habits cause overstretching of the abdominal muscles.

Strains

Improper material handling techniques can cause strains in other areas than the back. Strains to hands, wrists, arms, neck, shoulders, and legs are also common. They too can be prevented by using proper material handling methods. Continuous straining to any of these areas can lead to more serious problems.

Protecting Yourself

When you must manually lift an object, consider the following general lifting suggestions:

- Size up the load. Seek assistance if you think you need it.
- Get close to the load, with one foot alongside the load, and one foot behind it for balance. Get a firm grip on the object, with your palms, not your fingers.
- If possible, squat to the load, keeping your back straight, not necessarily vertical, just straight.
- Draw the load close to you, with the weight centered over your feet. Test to see that it's not too heavy.

- Lift by straightening your legs, avoiding quick, jerking motions. Your legs should provide most of the power to lift, not your back.
- Avoid twisting with a load, instead use your feet or shift to change direction with a load.
- When lifting above waist height, set the load down on a table or bench, shift your grip, and then lift again.
- Lifting comfortably is most important. Judge the most comfortable position for yourself.

Preparing for the Lift

- Stand comfortably as close as you can to the load, with feet apart for balance.
- If the load becomes too heavy or clumsy to lift on your first try, don't attempt the lift again without additional assistance.
- If possible, squat to the load, keeping your back straight. Try to avoid bending.
- Wear gloves that provide a good grip. Grasp the load firmly with your hands, with your fingers beneath the load if possible. Test it first to see that it's not too heavy.

Carrying the Material

Carrying objects not only exposes you to possible injury but can also pose a risk to other workers on the jobsite. Consider the following:

- Use two people, if needed, and agree in advance how a load will be moved.
- Don't let the object obstruct your vision; be sure of where you're going.
- Don't twist your body to change directions; use your feet instead. Twisting with a load puts enormous stress on the spine.

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With History of Success, John E. Green Selects Aquatherm PP-R Piping for School Expansion

John E. Green Co. of Highland, MI, cut labor and installation time by using Aquatherm's polypropylene-random (PP-R) pipe systems for a 2013 project at the University of Detroit Jesuit High School and Academy (U of D Jesuit). The project went so well that when U of D Jesuit and John E. Green teams reconvened in 2014 to plan the school's new science building, no other piping options were considered.

Past Success with Piping

Aquatherm's PP-R pipe systems played a key role in the success of the 2013 direct-bury water-source heat pump installation at U of D Jesuit. During that project, 4" Aquatherm Blue Pipe® was buried in an underground trench, serving as the supply and return piping that linked the campus' boiler house to a

50,000-square-foot building that originally housed the school's priests, but now serves as administrative space.

For that project, John E. Green provided design-build support. Bob Williams, director of plant operations at U of D Jesuit, worked closely with John E. Green's Mark Bobrowski, senior mechanical engineer of preconstruction services and a U of D Jesuit alumnus.

The 2013 installation is leak-free. The pipes will not corrode or leach into the soil and are environmentally friendly. In fact, Aquatherm currently has the only piping systems in North America that can contribute directly to LEED v4 credits.

Science Wing Takes Flight

Construction of the new science wing began at the end of the 2015 school year, and the new building opened in time for the 2016–2017 school year. The four-story, 40,000-square-foot science, technology, engineering, and math (STEM) center includes laboratories for robotics, chemistry, CAD, biology, and physics. It also houses U of D Jesuit's Shell Eco-Car program.

The new STEM center is the largest addition to the campus since the main school building of the current campus was built in 1930. (The original high school was built in 1877.)

To condense installation time to meet the construction schedule and save on labor costs, some sections of the new chilled-water pipe system were fabricated at Aquatherm North America's Lindon, UT, facility. With the fabrication assistance, Bobrowski noted, "we were able to maintain the schedule and budget by getting this work done efficiently."

Because of their light weight compared with metal pipe, Aquatherm fabricated spools were carried manually to the roof without a mechanical assist. Tying Daikin air handling units and air-cooled scroll compressor chiller and Armstrong pumps together is Aquatherm SDR 7.4 Green Pipe® in 2", 2 1/2", 3", and 4" diameters.

Aquatherm is joined by heat fusion. The pipe and fitting are placed on a 400–500° F heating iron, then connected. This process bonds the pipe and fitting at the molecular level without the use of chemicals or mechanical connections and eliminates systematic weaknesses and fail-points. Once the installation was complete, the Aquatherm-required pressure test was performed using compressed air. There were no leaks.

Seeing Is Believing

Aquatherm trained and certified John E. Green's Journeyman Pipefitter Josh Umphrey onsite to install Aquatherm piping. Although this was Umphrey's first experience with Aquatherm, he was impressed.

"The more you do, the better you become," Umphrey said. "Toward the



Left: U of D Jesuit's chilled-water system features Armstrong pumps and Daikin air handling units, like the one seen here. To meet the construction schedule and save on labor costs, John E. Green had some sections of the new system fabricated at Aquatherm North America's Lindon, UT, facility.

Above: John E. Green installed Aquatherm Green Pipe for U of D Jesuit's 45° F chilled-water application, keeping the building cool even on hot, humid days.

“The more you do, the better you become. Toward the end, I really had a good handle on what to do and how to make a perfect fusion [with Aquatherm’s heat-fusion process], and there’s definitely a labor savings compared to welding steel pipe.”

—Josh Umphrey, Journeyman Pipefitter, John E. Green

end, I really had a good handle on what to do and how to make a perfect fusion, and there’s definitely a labor savings compared to welding steel pipe.”

He added that there is a tendency to be skeptical when a product almost seems “too good to be true.”

“Most of us tradesmen in the field are ‘I’ll-believe-it-when-I-see-it’ types,” said Umphrey. “But I will say that after going through the process and the pressure test, I’m more than comfortable installing and recommending Aquatherm pipe.”

Safe and Efficient

Bobrowski recommended and specified Aquatherm for the project’s chilled-water piping system because it is corrosion-resistant and will

not scale. No hot work permits are needed because Aquatherm’s heat-fusion technique poses virtually no fire hazards. Additionally, no solder or glues are used that could wear or corrode the pipe.

Because Aquatherm is so light, installers can move faster without the risk of injury that often accompanies metal pipe, saving on labor costs. The pipe’s light weight also eliminates the need for extra heavy-duty hangers. Finally, joining the PP-R pipe via heat fusion speeds up the welding process, saving even more on labor costs.

“I think it was a good deal for U of D Jesuit and a good experience for John E. Green,” Bobrowski said. He called Aquatherm’s PP-R piping “a great new product” and anticipated using

Aquatherm piping on future jobs.

Most importantly, the customer is pleased. “When [Bobrowski] first introduced the Aquatherm pipe to us, I liked its insulation properties and the speed of putting it together,” Williams said. “On [the 2013] job, the team had budgeted for the trench to be uncovered—and an excavator operator required onsite at his hourly rate—for eight or nine days. The Aquatherm installation only took six days. If we had put steel or welded pipe in, it would have taken a lot longer and increased costs dramatically.

“So when John E. Green wanted to bring it in on this other project, I was all for it,” Williams continued. “On this project, we again appreciated the inherent insulating properties of the Aquatherm pipe, and we can bill this as a green product. Even though we’re not building a totally green building, we’re able to boast a bit about what we are doing here.”

For more information, visit www.aquatherm.com.



Top Left: On the roof of the new STEM center, John E. Green paired Aquatherm’s Green Pipe with a 142-ton Daikin air-cooled scroll compressor chiller. Because of their light weight compared with metal pipe, Aquatherm fabricated spools were carried manually to the roof without a mechanical assist.

Bottom Left: The chilled-water Aquatherm Green Pipe in hangers on the rooftop of U of D Jesuit’s new STEM center required protection from ultraviolet rays because it is exposed to sunlight.

Above: Pipefitter Foreman Josh Umphrey (left) and Pipefitter Jason Young of John E. Green found that Aquatherm pipe is much lighter than metal pipe, so they can work faster and save on labor costs. The light weight and heat-fusion joining process also improve jobsite safety.

T.H. Eifert Closes Over \$400,000 in PM/Projects in First 12 Months with BuildingAdvice

Just one year after investing in the BuildingAdvice Energy Services Delivery platform, T.H. Eifert Mechanical Contractors has generated in excess of \$400,000 in new preventive maintenance (PM) contracts and pull-through sales, providing a sizable, early return on investment. The energy assessment and tracking tools from BuildingAdvice help T.H. Eifert make a solid case for installing and maintaining energy-efficient products.

Measurement Is Key

“Measurement is the key to overcoming inherent customer skepticism. Our clients are tired of hearing providers constantly making unsubstantiated claims regarding energy savings,” said Jeremy Harrison, T.H. Eifert general manager. “We now use measurement throughout our sales and fulfillment process to build credibility, even measuring savings after completing projects or PM work. Our customers are far more engaged, and it’s showing in the pull-through work we are getting.”

According to Justin Jensen, energy manager at T.H. Eifert, his team uses the Energy Savings Potential (ESP)

report to discuss energy consumption with prospects and to close new PM sales that include energy savings as a measurable goal. “Prospects really appreciate the way the information is presented. It’s clear, concise, and understandable,” said Jensen.

T.H. Eifert uses the Energy Savings Assessment (ESA) to graphically demonstrate sources of waste and discomfort with existing PM clients. By placing wireless sensors throughout the facility, T.H. Eifert can record the building’s actual performance when occupied and unoccupied. Typically, buildings have issues with occupants overriding controls, cleaning crews overriding controls, cleaning crews leaving lights on, and, due to over-engineering, too much fresh air being introduced on a 24/7 basis.

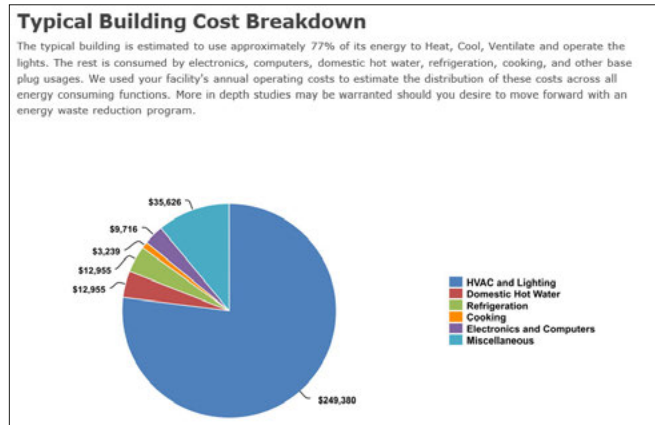
Clear Data Make the Case

Jensen gave an example of the ESA’s effectiveness. “We had been working with a tier-1 automotive client for a year-and-a-half to justify a comprehensive PM program, but couldn’t get it over the finish line. We explained a lot of the issues and did some studies. But no decision. Once he saw the ESA report, our client said he now

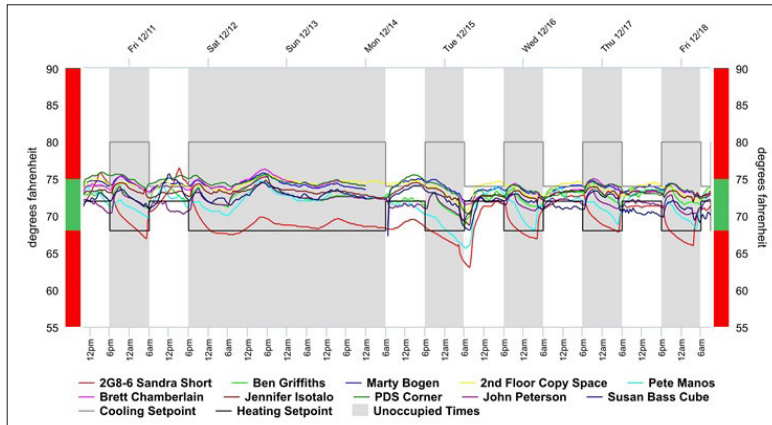
had what he needed to go upstairs and convince his boss. That resulted in a \$76,000 PM and \$50,000 in pull-through work.”

Now, T.H. Eifert is using SavingsTracker to track energy savings results at the facility. “Being able to document the impact of our upgrades on their energy consumption is huge,” Jensen explained. “BuildingAdvice actually captures and inputs the utility bills for each month. The utility data automatically populates a web-accessible dashboard that the client can also access. Reports can be generated periodically so we can sit down with our clients and analyze our results.”

Jensen also appreciates how SavingsTracker customizes the data. “One nice thing is the data can be normalized for weather and a number of variables, so we are getting a real apples-to-apples comparison to the baseline BuildingAdvice created for us,” said Jensen. “In this case the client added over 40,000 square feet, and the model took this into account. Having started with the ESP, using the ESA to identify actual waste, and now using SavingsTracker to continuously



With BuildingAdvice technology, T.H. Eifert can generate reports efficiently using client data. “Prospects really appreciate the way the information is presented. It’s clear, concise, and understandable,” said Justin Jensen, T.H. Eifert energy manager.



T.H. Eifert gathers data from wireless sensors placed throughout the facility that record the building’s actual performance during occupied and unoccupied times. The Energy Savings Assessment tool from Building Advice gives a graphic display of energy waste—for example, showing temperature dips and spikes when the building is unoccupied.

"We now use measurement throughout our sales and fulfillment process to build credibility ...and it's showing in the pull-through work we are getting."

—Jeremy Harrison, General Manager, T.H. Eifert

monitor our progress, we are definitely walking the talk. Our clients' reactions are really building our confidence."

In another case, T.H. Eifert assessed a LEED-certified medical facility that was also Energy Star-certified in 2010 with a score over 75. By the time the T.H. Eifert team was invited in by the client, the building's score had dropped to a 4. The ESP and ESA reports documented that the building was operating quite inefficiently. The ESA showed that the incumbent contractor converted the entire building to a 24/7 schedule to accommodate the operating theater's schedule.

Using the customer's own data, the T.H. Eifert team educated the client about how their HVAC and lighting systems were losing so much money in energy and utility bills. "They had no idea that the systems our industry installs, maintains, and controls could be such a significant source of waste," said Jensen. "Rather than inundating them with engineering surveys and calculations, we were able to use simple, understandable graphs to educate them. Once they got it, we had no problem engaging them in implementing our program."

Jensen continued, "BuildingAdvice enabled us to isolate the largest sources of waste, document these sources in graph form to the client, and provide a clear path to correcting the issues. This generated a new PM worth \$46,000 and another \$160,000 in projects closed. Because we measure, we win these types of projects."

Tools for a Changing Business

While new tools and processes can slow down a sales process, Harrison

noted, "BuildingAdvice is actually shortening and streamlining our sales process. Their clear process for approaching building owners and operators positions us as partners that can help measurably lower operating costs. They aligned well with our existing sales process and gave us the tools we needed to overcome the objections and questions that traditionally derailed us. They automated so many steps that we can now efficiently generate reports using client data making the information tangible and believable. This has been the breakthrough."

Asked about the timing of incorporating energy services into their business, both Harrison and Jensen indicated that the threat from some of the global and national players made it a necessity. Harrison said, "Our customers are getting more savvy; they expect us to be able to partner with them to lower their costs. They know the systems we install, maintain, and repair can be the biggest consumers and wasters of energy. So, we knew we'd either have to step it up and compete with the big boys or watch them take our customers."

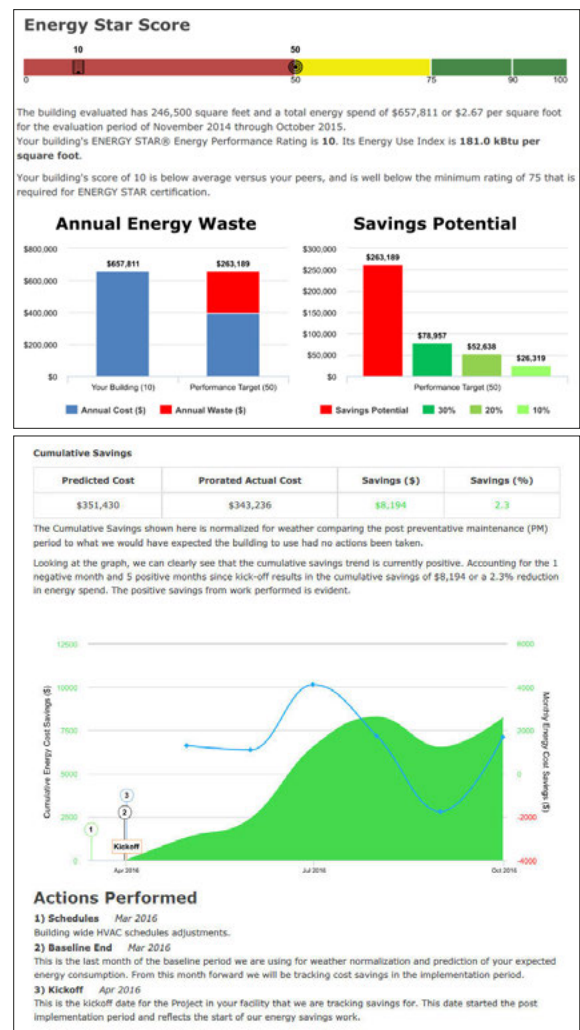
Top Right: T.H. Eifert uses the Energy Savings Potential report from BuildingAdvice to make a clear case for energy-saving projects and PM based on real user data.

Right: Thanks to BuildingAdvice, T.H. Eifert can demonstrate the impact of its efforts, even tailoring data to reflect recent weather patterns. T.H. Eifert General Manager Jeremy Harrison said, "Our customers are far more engaged, and it's showing in the pull-through work we are getting."

"It's sort of becoming an arms race. With BuildingAdvice we now have the tools to compete with the larger service companies that have all the corporate resources," Harrison observed.

In addition to BuildingAdvice, T.H. Eifert has invested in technology to continuously monitor their clients' facilities through real-time information from the control system. Continuous monitoring helps to not only drive new savings opportunities, but also ensures that savings that have been generated in the past continue to grow and don't regress.

For more information, visit buildingadvice.us.



L.J. Kruse Company Increases Profits and Reduces Errors with MobiliForms

By transitioning from paper forms to iPads using MobiliForms from iBusiness Technologies, L.J. Kruse Company saved time, increasing its billable hours. “We have dramatically reduced the time spent transporting and handling paperwork as well as eliminated mistakes,” said Nathan Kruse, vice president, L.J. Kruse Co. “MobiliForms has already paid for itself in time savings and eliminating errors.”

L.J. Kruse is a 100-year-old family-owned business providing plumbing, heating, and cooling services to commercial and residential customers in California’s Bay Area. The company also helps build new hospitals, laboratories, office buildings, and institutional facilities. They perform maintenance and service as well for existing buildings and design and install plumbing and medical gas systems.

L.J. Kruse appreciates the time savings, error reduction, and improved customer satisfaction that comes from

using MobiliForms. Most important, however, is the resulting increase in billable hours, which boosts the bottom line and quickly pays for the hardware and software. L.J. Kruse now completes most of its paperwork—including daily logs, material

“MobiliForms has already paid for itself in time savings and eliminating errors.”

—Nathan Kruse, Vice President,
L.J. Kruse Co.

orders, job hazard analysis, and time cards—on iPads for immediate access by office personnel and same-day billing.

iBusiness Technologies partnered with Apple to provide the iPad-based MobiliForms solution to MCAA members at a discount. MobiliForms does not require any change to an organization’s backend software, and all documents appear on devices exactly as they do on paper.

“Our biggest concern about making the switch from paper to mobile was training and getting people up to speed with using handheld devices,” said Kruse. “The MobiliForms’ teamwork with our industry made the transition quick and easy. Our foremen like having their familiar, identical documents, and using the iPads has become second nature.”

MobiliForms also capture site photos, signatures, and sounds and can perform mathematical computations. Documents can be started in office for field completion or started in the field. “Before MobiliForms, everything was handwritten or called into the office, requiring forms to be handled multiple times by several people. Now all forms are completed daily, transmitted to the office, and stored electronically in the correct job file,” said Kruse.

For more information, call 877-565-3261 or visit MobiliForms.com. Or, contact Steve Metzman at 215-850-5565 or steve.metzman@iBusiness-Tech.com.



L.J. Kruse’s Greg Stewart, field safety coordinator (left), and Ben Kruse, journeyman, complete project documents using MobiliForms, saving time and improving efficiency on the job.

With KEY2ACT Software, Customers See What MacDonald-Miller Sees

New Technology Prompts Faster Payment, Spurs New Business

MacDonald-Miller Facility Solutions partnered with KEY2ACT to create See, software that allows contractors to use smart glasses on job sites to capture photos and videos of their work. The new technology helped MacDonald-Miller speed up customer payment and dramatically cut down the time spent explaining work that was done to customers disputing charges. It also increases customer engagement, building trust and leading to new work.

Leveraging Mobile Devices

MacDonald-Miller is a full-service design-build mechanical contractor that focuses on making buildings work better. With broad design, retrofit, and service capabilities, the company specializes in providing answers for its clients' toughest build-ing challenges.

With more than 1,000 employees, including 100 service technicians, MacDonald-Miller is already a leader in the Pacific Northwest, counting companies such as Nike, Boeing, and Microsoft among its clients. But like every leader, MacDonald-Miller is continuously challenged to stay ahead of the competition.

Recently, company leaders took a hard look at the technology behind their business to determine needed areas of investment, said Bradd Busick, MacDonald-Miller's chief information officer. Mobility and collaboration were the two drivers identified as key to ensuring MacDonald-Miller's continued success and growth. "We have over 1,000 mobile devices running around our shop," Busick said. "We wanted a way to be able to take those devices and allow people to collaborate while they were mobile."

All Eyes on Tech

Around the same time, MacDonald-Miller learned about an interesting new product being used by a similarly sized Tennessee-based company. Facing a technician shortage and a desire to improve customer relations, that company had recently started equipping its field techs with smart glasses to shoot pictures and video of their work.



With KEY2ACT's See software, Travis Eshpeter, a service foreman for MacDonald-Miller, uses smart glasses to easily link videos and pictures to service calls. As a result, MacDonald-Miller has spent less time disputing charges and has seen faster bill payment by customers.

Intrigued, Busick and Rory Olson, MacDonald-Miller's service operations manager, began thinking about how the same technology could be used at MacDonald-Miller. They knew, however, that a connection to MobileTech was essential. "We couldn't do it without KEY2ACT," Busick said.

So KEY2ACT developers partnered with XOEye Technologies, the company behind the smart glasses, and MacDonald-Miller to create See, KEY2ACT's new product that enables MobileTech users to easily link video and pictures to customer accounts. Everything technicians do with their smart glasses is automatically

streamed to the cloud, creating one central repository of visual evidence. Customers are provided access to selected photos and videos of the completed work through a link on the job's call summary report.

Customers that have experienced See are excited about the visibility provided by the technology. "To me, the coolest thing is the custom-

er's reaction when they get it," said Travis Eshpeter, a service foreman for MacDonald-Miller. "They're pretty shocked that there is this technology out there."

Seeing Builds Trust

From MacDonald-Miller's perspective, one of See's biggest benefits is the opportunity it provides to increase customer engagement. Much of the work done by MacDonald-Miller, like pipe and duct work, is hidden behind walls. Other pieces of equipment are in locations that aren't easily accessible, like the roof or basement. See does exactly what the name implies: It allows customers to finally see exactly

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Appion Inc. Offers Tips on Removing Restrictions for Fast Refrigerant Recovery

While refrigerant recovery is accepted as a fact of life for today's air conditioning and refrigeration (AC/R) technicians, it remains one of the most time-consuming steps in servicing an AC/R system. This can make it tempting for a technician on a tight schedule to skip the recovery process. However, with the proper understanding of equipment and methods, refrigerant recovery can be faster and easier than venting. Just like tires can affect a car's performance, the hoses, fittings, manifold, and recovery cylinder all play a role in how quickly and efficiently the recovery process is completed.

Hoses and Hose Fittings

During refrigerant recovery, 1/4"-diameter charging hoses are effectively capillary tubes, greatly reducing flow and potentially causing trouble throughout the process. Quick-disconnect and auto-shutoff hose fittings incorporate valve mechanisms that not only restrict the flow of refrigerant but can act as a metering device during liquid recovery, leading to other problems such as overheating tanks. Using hoses equipped with ball valves meets the Environmental Protection Agency's (EPA's) low loss fitting requirement while ensuring full refrigerant flow during the recovery process.

Even when recovering from systems with 1/4" service valves, using 3/8"-diameter hoses reduces resistance and allows a full flow of refrigerant to reach the recovery machine and, ultimately, the recovery cylinder. Using a shorter length of hose between the recovery machine and cylinder will also reduce the amount of refrigerant released, ensuring de minimis thresholds are not exceeded.

Recovery Cylinder Capacity and Ratings

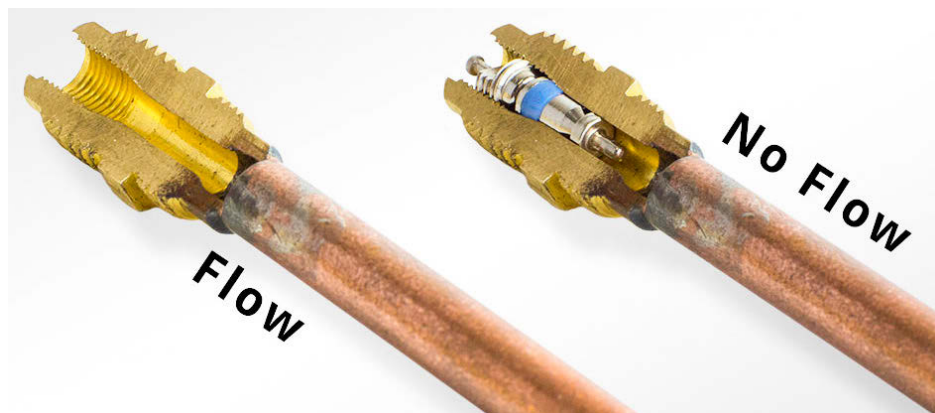
For safety reasons, it is important to never exceed 80 percent of a recovery

cylinder's rated capacity. In addition to safety, using a cylinder with extra capacity reduces back pressure towards the end of the recovery process, making the EPA's 10–15 inHg vacuum requirement much easier to reach. For the best results, start with a new recovery cylinder that has already been evacuated below 500 microns. As

partially-opened manifold valves, and worn-out hoses. A valve core blocks about 90 percent of the inside of an access valve, while a core depressor blocks about 50 percent of the hose fitting. Overheating of the recovery cylinder and high cylinder pressures are often symptoms of input restrictions.



A core depressor blocks about 50 percent of the hose fitting, creating input restrictions, or points between the AC/R system and the recovery machine that can severely reduce the liquid flow.



A valve core blocks about 90 percent of the inside of an access valve, creating an input restriction. Enabling a full liquid flow to reach the recovery cylinder using 3/8"-diameter hoses will enable better thermal transfer through the cylinder walls and, ultimately, reduce cylinder pressures and temperatures overall.

always, make sure the recovery cylinder is rated for the refrigerant being recovered.

Removing Restrictions for Recovery

"Input restrictions" are points between the AC/R system and the recovery machine that can severely reduce the liquid flow. These points include valve cores, core depressors, restrictive hose fittings,

Just like a metering device in the AC/R system, the pressure drop caused by the restriction can result in low-density superheated vapor being fed to the recovery machine. As with an undercharged condensing unit, this limited flow of vapor can render a recovery machine's condenser useless. When the heat from the recovery machine's compressor is added, the

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10 Things You Need to Know About Commercial HVAC Regulations

Emerson conducted a survey in 2015 of more than 450 HVAC professionals and found that only 11 percent are aware of upcoming commercial HVAC regulations and many don't understand how those regulations will impact their business. Here are 10 things you need to know about the changes affecting the commercial air conditioning (AC) market.

1. Changes will affect many buildings.

According to the U.S. Department of Energy (DOE), over half of the commercial real estate space in the United States is cooled by packaged HVAC equipment.

2. New energy code adoption is done state by state.

The latest revision for commercial HVAC is ASHRAE 90.1-2013, which has already been adopted by five states. The balance of states have either adopted revisions that are older or have no standard code.

3. New nationwide DOE minimums go into effect next year.

New commercial rooftop and split system efficiency regulations will go into effect January 1, 2018, for integrated energy efficiency ratio (IEER) minimums. The IEER is used as a representation for part-load performance.

4. New regulations will be implemented in two phases.

The first phase will begin in 2018 and will require, on average, a 13-percent efficiency improvement in systems. Five years later, an additional 16-percent increase in efficiency, on average, is required for new commercial units.

5. New regulations are expected to lead to cost savings and less pollution.

Over the lifetime of the products, businesses will save \$167 billion on their utility bills, and carbon pollution will be reduced by 885 million metric tons.

6. New efficiency tiers for advanced rooftop units (RTUs) are already in place.

The Consortium of Energy Efficiency (CEE) released final efficiency tiers that went into effect January 12, 2016. An advanced RTU is defined as one that meets or exceeds the CEE Tier 2 unitary AC specification.

7. Buildings will need new or retrofitted higher-efficiency RTUs.

A building owner can save as much as \$3,700 per RTU by replacing aging equipment with high-efficiency units or retrofitting with advanced controls. Consider that a typical big-box retailer may have more than 20 units.

8. Regulations are driving system redesign.

System manufacturers are redesigning AC equipment now to meet 2018 minimums and revising product portfolios to include new mid- and premium tiers above the minimum levels.

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ADVANCED ROOFTOP UNITS (RTUs)

The Consortium of Energy Efficiency (CEE) released final efficiency tiers that went into effect January 12, 2016. An advanced RTU is defined as one that meets or exceeds the CEE Tier 2 unitary air conditioning specification.

CEE commercial specifications for air cooled packaged / split systems (with electric heat)

	6 to 10T	11 to 20T	21-63T
CEE Tier 1	11.7 EER 12.9 IEER	11.7 EER 12.4 IEER	10.5 EER 11.6 IEER
CEE Tier 2	12.2 EER 14.0 IEER	12.2 EER 13.2 IEER	10.8 EER 12.3 IEER
CEE Advanced Tier	12.6 EER 18.0 IEER	12.2 EER 17.0 IEER	10.8 EER 13.5 IEER



New CEE efficiency tiers for some products went into effect in 2016.

Honeywell's Detailed Guide to Retrofitting R-22 AC Units

With the phase out of R-22 by 2020 driving up pricing, contractors are looking for more options to retrofit R-22 air conditioning (AC) units without having to change the oil. "Generally speaking, you can see system improvements after a retrofit as a result of recommissioning the equipment," said Ron Vogl, global technical marketing and services manager for **Honeywell Refrigerants**.

"These performance improvements are the result of properly setting the controls and system operating valves such as thermal expansion controls, which may have wandered from set-point due to lack of maintenance, etc.," Vogl explained.

"For proper performance, it is a must to evaluate the head pressure management controls (if present) during the retrofit. Setting up the evaporator operating pressure and the system's condensing pressures for the selected replacement's specific pressure-temperature relationship is imperative. Leaving R-22 set-points will lead to subpar performance or increased energy consumption.

"Technicians must be aware that all new HFC (hydrofluorocarbon) substitutes for R-22 are blends and possess glide. The technician must get comfortable with terms such as 'bubble' and 'dew' and know which values to apply and how," Vogl continued.

In retrofitting an existing air conditioning system, following a systematic albeit simple series of steps can help ensure successful completion of the job.

Record Baseline Data

Compare the current system operating data with normal operating data before any hardware changes

are made. Compare deficiencies, if any, and make note of the final data as a performance baseline, including superheat and subcooling temperature and pressure measurements throughout the system.

Isolate R-22 Refrigerant Charge

Remove the HCFC (hydrochlorofluorocarbon) refrigerant charge from the system with an approved recovery machine that can meet or exceed the required evacuation levels and collect it in a recovery cylinder. Record the weight. Do not vent the refrigerant.

Choose Compressor Lubricant

Honeywell recommends using a miscible lubricant approved by the compressor manufacturer. In this case, polyolester (POE) oil is recommended for R-422D. A lubricant change is warranted when it is contaminated or indicates high levels of acidity.

Evaluate the Expansion Device

Consult with the equipment manufacturer before retrofitting. Most HCFC-22 AC systems with either expansion valves or capillary tubes will operate satisfactorily with Honeywell's Genetron® 422D (R-422D).

Replace the Filter Drier

Replacement is a recommended service practice. Consult with your wholesaler to ensure that the replacement filter drier (loose-fill/solid-core) is compatible with the Honeywell refrigerant being used.

Reconnect the System and Evacuate

Reconnect and evacuate the system using normal service practices. A full vacuum of 1,000 microns or less is recommended for evacuating from both sides of the system. Recharge the system (note that pounds of 422D equals pounds of original

refrigerant multiplied by 70.9 and divided by 73.9).

Check the System for Leaks

Normal service practices can help identify leaks from the system and rectify them before retrofitting.

Charge System with Refrigerant

Replace HCFC-22 with an R-422D refrigerant, such as Genetron 422D, using the same charging procedures as for the refrigerant being replaced. It is important to keep in mind that Genetron 422D is a blended refrigerant and should be charged by removing only liquid from the cylinder.

Check System Operation

Start the system and wait for the operating conditions to stabilize. If the system indicates an undercharge, add refrigerant in increments of 5 percent by weight of the original charge until the desired conditions are established. Adjust to obtain superheat values similar to the original operation.

Label Components and System

Upon completion, label the system components for identification of the refrigerant and specify the type of lubricant (by brand name) in the system. These labels will be a useful reference during future servicing of the equipment.

Other Quick Tips

- Never vapor charge the system with vapor from a 400-series.
- When changing to an HFC-miscible lubricant, particularly to a more polar lubricant such as POE oil, it may be beneficial to add a suction line filter.
- Change any system O-rings, including Schrader valves.
- Attempting to evacuate a system with the pump connected only to the low side of the system will

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Team Industries Decreases Training Time, Increases Efficiency with Miller PipeWorx Welding System

Since they started using the Miller® PipeWorx 400 welding system, Team Industries has reduced rework—saving time and money—because of the system’s ease of use and consistent arc quality. “We have seen a decrease in X-ray failure. The consistency of the arc definitely plays a role in that,” said Jim VanZeeland, shop superintendent. “It’s just been a great machine for us.”

The PipeWorx system offers conventional stick, TIG, MIG, and flux-cored welding processes optimized for pipe welding, in addition to advanced wire processes including pulsed MIG and Regulated Metal Deposition (RMD®) from Miller. The versatile, multiprocess machine has a simplified, single-system design.

Team Industries relies on the PipeWorx welding system to stay on the cutting edge of welding technology and exceed customer expectations. The pipe fabrication company, with three locations in Wisconsin and Texas, has established a one-stop shop process to set themselves apart and to meet customer demands. Team Industries has a reputation for delivering high-quality pipe and tank fabrication on time and within budget, with the capacity at its three shops to produce up to 6,500 spools per month combining large and small bore.

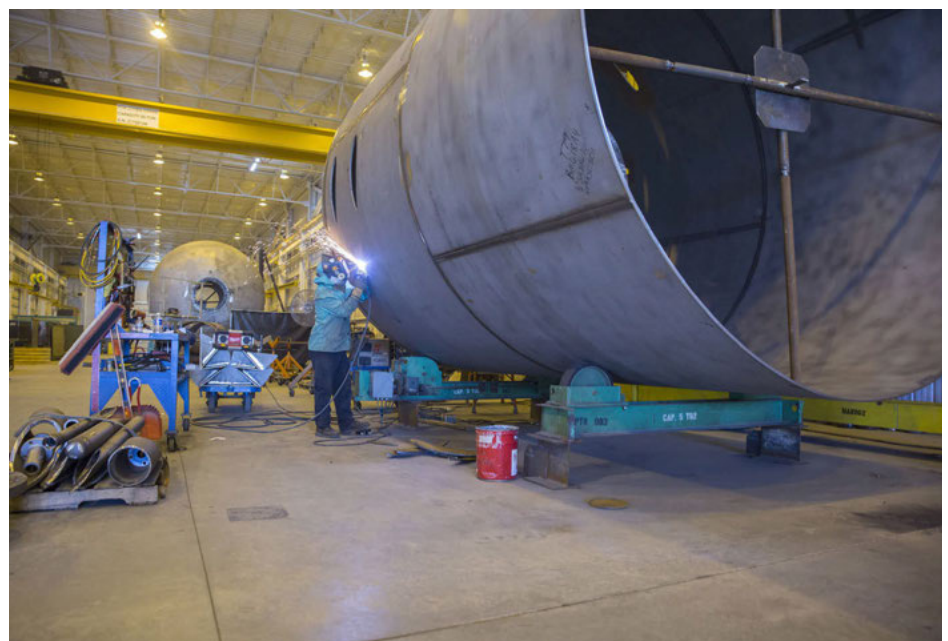
Team has standardized its welding booths with the PipeWorx 400 welding system, which fits the company’s varied welding requirements. The single-system design with one machine footprint helps maximize weld cell space.

Equipment that is easy to use plays an important role in training and

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“The quicker we can get people to pass X-ray the better it is for us, and the PipeWorx system really helps us do that.”

—Mike Schmidt, Vice President of Manufacturing, Team Industries



Top: Team has standardized its welding booths with the Miller PipeWorx 400 welding system, which fits the company’s varied welding requirements. The single-system design with one machine footprint helps maximize weld cell space.

Bottom: Using the Miller PipeWorx 400 welding system, Team Industries has reduced rework—saving time and money—because of the system’s ease of use and consistent arc quality.

ANVIL

continued from page 1

on the eastern side, the 7,710'-long bridge replaces the previous 7,578' bridge, which was the longest floating bridge in the world. The new bridge is designed to reduce traffic congestion and improve safety. The bridge opened to traffic on April 11, 2016.

Two important components of the construction of the bridge were the design and construction of the dry standpipe fire systems and the mechanical wastewater removal system to remove rainwater from the road surface and filter it before returning it to the lake. Contractors for these systems needed grooved pipe couplings, hangers, and other piping products that would meet or exceed the needs of this unique bridge style, and they reached out to Anvil International to supply the products.

The State of Washington Department of Transportation (WSDOT) sought to replace the existing bridge with a wider span that would reduce traffic congestion and improve overall safety for cars, cyclists, and pedestrians. The new bridge has two standard travel lanes, as well as an HOV (high-occupancy vehicle) lane, a shared 14'-wide bike/pedestrian access path, and shoulders of 4' at the inside and 10'

on the outside. It is also designed to better resist severe storms and earthquakes than the previous one.

A floating bridge design was selected due to the depth of Lake Washington (over 200' at its deepest point) and the soft condition of its lakebed. A more conventionally designed bridge would require very tall support towers to support the roadbed, which would be cost-prohibitive. Instead, the bridge's roadbed is supported by a series of large, floating concrete pontoons. Because the bridge floats on the surface of Lake Washington, it must be designed to expand, contract, and roll with the motion of the water, whether that motion comes from wind, storms, thermal changes, or other factors.

The new bridge consists of two separate decks: an upper deck for traffic and a lower deck for maintenance and operations. The bridge features a mechanical wastewater removal system that handles the removal of rainwater from the roadway. In addition, it has remotely controlled fire protection dry standpipe systems. Approximately 1.5 miles in length, the bridge is constructed much like a viaduct, with a superstructure that rests between 14' and 80' above the 23 pontoons, the largest of which are 360' in length. The design and construction of the bridge took approximately four years.

Wastewater System Keeps Roadway Clear

As the contractor for the rainwater removal system, Diamond B looked to Anvil products to meet its needs. "Our company has a history of purchasing products from Anvil International, and so we were confident that their products and service would meet our needs for quality, reliability, and price," said B. J. Winn, general foreman at Diamond B. "All told, this project went very well, and the products and support that we received from Anvil contributed to that success."

Rainwater flows off the bridge deck into a series of 160 catch basins on the bridge, designed to trap sediment at the bottom. From there, it filters through Schedule 40 pipe ranging from 10" down to 6" and ends up in the 44 sump wells built into the bottom deck of the bridge. These sump wells are located in the middle of the pontoons, so that the rainwater flows back into the lake but is separated from the rest of the lake water so that oil from the roadway doesn't contaminate the water and can be cleared off of the surface of the isolated wells periodically.

The motion of the bridge from the water was also of concern with the wastewater pipes. The Anvil Gruvlok® 7000 Series lightweight, flexible

Left: American-made Anvil products, such as this endcap from the Gruvlok 7000 Series Fire Protection line, were the ideal choice for contractors like Diamond B and others to meet the purchasing requirements for the partially federally funded bridge.

Middle: Diamond B and other contractors relied on Anvil's Gruvlok grooved couplings because they are ideal for the floating bridge's rainwater removal system and dry standpipe fire systems.

Right: Diamond B found that Anvil's 7000 Series couplings are flexible enough to handle the motion of the floating bridge.



grooved couplings were selected for their ability to handle the pipes' motion.

Anvil hot-dip zinc galvanized the couplings and then sent them to a company in Portland, OR, for an epoxy coating. This step was deemed necessary for ecological reasons by the bridge designers, who feared that the galvanization would flake when in contact with water and negatively affect lake wildlife.

In total, the rainwater removal system contains approximately 15,000' of pipe, 3,000 pipe couplings, and 1,500 pipe fittings. It is located under the bridge's traffic deck on both sides and spans the length of the bridge. It took approximately 14 months to install and was completed in March 2016.

Fire Suppression System Ensures Safety

Because the bridge is too long to rely exclusively on fire trucks for fire suppression water supply, it requires dry standpipes along the length of the bridge. Once they arrive, trucks can



The new Route 520 Floating Bridge, featuring Anvil International products in critical roles in both the fire suppression dry standpipe and wastewater removal systems, opened on April 11th, 2016.

access one of the hose stations along the bridge, drawing up lake water for use in fighting fires.

The fire standpipe is split into two separate systems. Each system has two 180-pounds-per-square-inch, 1,250-gallons-per-minute vertical turbine fire pumps and motorized valves as primary and secondary sources of water, ensuring backup in the event of a pump failure. The systems are interconnected with a motorized valve, which is a third source of water in the extremely unlikely event that the first two sources should fail. All of these systems are remotely controlled from the WSDOT monitoring station in Shoreline, WA. Bridge and fire authorities have several other options for activating the fire systems, which are also remotely operated from the local maintenance building or at the hose stations themselves.

The fire suppression systems include approximately 8,000' of 8" Schedule 40 piping, all of which must be joined with appropriate pipe couplings that must be flexible so that they can withstand the bridge's motion. Anvil's Gruvlok grooved

couplings precisely met the needs of the project.

In addition, most of the hanger assemblies consist of roller hangers attached to Anvil Strut/Channel. They serve to suspend the fire system's dry standpipe from the underside of the bridge's upper deck. They give it the flexibility to move independently of the bridge, which is critical to the pipe's ability to withstand the motion of the bridge from the water. Anvil provided rollers, nuts, bolts, clamps, rods, and various channel materials for all of the hanger assemblies of various designs, working closely with contractors to ensure that the couplings and hangers met their needs exactly.

The couplings and components of the hanger assemblies were all hot-dip zinc galvanized by Anvil, a critical project requirement. Anvil also ensured that even after galvanization, all of the fittings fit together properly, saving time during construction. The Anvil team was praised for being responsive to design changes, easy to contact, and able to provide information like product documentation backup promptly.

Bridge Opens to Traffic

The bridge's grand opening took place on April 2, 2016. Shortly afterward, the bridge was open to traffic, and its predecessor was taken out of commission. Anvil International played a critical part in the construction of this new, safer bridge, meeting the needs of both the fire and wastewater system contractors for high-quality, high-value, and American-made products, designed to the exact specifications necessary for the project.

For more information, visit www.anvilintl.com. MCAA thanks Anvil International for being a major sponsor of MCAA 2017 and supporting the Fun Run/Walk.



Anvil hot-dip zinc galvanized and coated the couplings for Diamond B's wastewater removal system with epoxy, ensuring that bridge design requirements were met and wildlife is protected.

VICTAULIC

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completing projects similar to the Detroit News Building on time,” said Phil Orsi, project manager for Western Mechanical. Orsi knew how troublesome retrofitting old buildings could be and that without the right partner, the project could quickly go over budget and last longer than projected.

Overcoming Challenges

The crew had very limited space within the building to operate. The building’s boiler system, mechanical spaces, and hydronics were located primarily on the uppermost floors, which did not have elevator access. So, when it came time to deliver the product, Victaulic’s Construction Piping

Services (CPS) division was a crucial component for success.

Time was of the essence. The streets surrounding the Detroit News Building were closed so a crane could transport materials to the higher floors. Thanks to Victaulic’s project management and internal coordination through the CPS team’s modeling, spool sheets, and bagging and tagging services, the duration of the street closure was reduced by three days, minimizing labor costs and scheduling delays.

Throughout the project, Western Mechanical encountered other challenges, including the one tenant that remained in place during the retrofit. Hundreds of people occupying one full floor with high ceilings and openings—and thus unique air distribution—made climate control a major challenge. The contractor was also tasked with providing uninterrupted air conditioning to that floor during the hot summer months, as well as bringing the new heating system online in time for the frigid Michigan winter.

For Western Mechanical, the tenant’s presence required a two-pronged approach:

- Phase one, from July 2015 to September 2015, involved swapping out and installing the new heating system, including five new air handling units, while leaving one of the current units in place to cool the occupied floor.
- Phase two, from September 2015 to April 2016, consisted of installing the new water-cooled modular chiller system. The chiller heat was rejected to a closed loop condenser water system, which was cross-coupled via heat exchanger to the rooftop cross-flow cooling tower. This extra cooling loop, in



Top: While a manual field measure would have taken two people three days to measure everything by hand, a 3D scan using Victaulic technology took one day. The new 3D scan allowed for detailed planning and modeling by designers, which ultimately helped Western Mechanical streamline its schedule and keep labor costs in line.

Bottom: With Victaulic’s project management and coordination, Western Mechanical cut days off the schedule for restoring the 100-year-old Detroit News Building in downtown Detroit, MI.

addition to the variable primary flow distribution equipment, made the existing chiller room—which was a tight area to begin with—even tighter.

New Tech for Old Buildings

Antique buildings, such as the Detroit News Building, predate 3D modeling software, and usually the original blueprints are compromised by changes resulting from renovations. Victaulic made the decision to conduct a new scan and register the building's point cloud. Unlike manual measuring, the scan captures all surfaces without the need to move equipment already in place and avoids human error in manual measurements.

The 3D scanning technology increases operational efficiency by supplying data files that can be easily uploaded into architectural software. While a manual field measure would have taken two people three days to measure everything by hand, this 3D scan took one day. The ability to incorporate a new 3D scan allowed building designers to conduct detailed planning and modeling, which helped streamline the schedule and keep labor costs in line.

Holistic Approach

By making this an all-Victaulic project and leveraging its suite of complementary solutions, the project timeline was substantially reduced and the project was completed on time and

within budget. “The business relationship was outstanding,” added Orsi. “All parties involved in this retrofit project agree it would have never happened without Victaulic’s solutions.”

And just as Bedrock anticipated, the now-trendy Detroit News Building is attracting innovative, growth-oriented companies. Current tenants include an expanding California-based health care provider and an up-and-coming high-speed internet service provider.

For more information, visit www.victaulic.com. MCAA thanks Victaulic for being a major sponsor of MCAA 2017 and cosponsoring the Golf Tournament.

DAIKIN

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stages across the three buildings. Installers had limited access to the lower-level mechanical room, which required disassembly of the chillers prior to installation, including draining of the refrigerant system.

Daikin's turnkey solution included a complimentary subscription to energy management software that allows the owners to remotely monitor the performance of their buildings at Capitol Park.

Efficiency Pays Off

The chillers have been fully operational at Capitol Park since April 2015. “I think everybody has seen the improvement on the consistency of comfort,” said Wilson. “Before, in really hot months, on the higher levels of the buildings, the old chillers couldn't cool enough. We don't have that problem anymore with the Daikin chillers.”

Wilson frequently monitors electrical usage of the entire complex through the energy management software portal and values the access to actual consumption data, which allows him to audit bills from the electrical utility. “The ability to manage your costs on a real-time basis is quite significant, and it's really helpful from an environmental standpoint to see how you stack up against the rest of the country,” he said. Wilson pointed out that the new Daikin chillers have reduced cooling consumption by about 10 percent over the former chillers.

With the Daikin chillers, air handlers, lighting replacements, and other energy improvements, the Capitol Park complex is 15–20 percent more efficient than similar buildings across the country. The energy-efficient chillers have contributed to impressive energy savings. Calculations by the

energy management software over two periods (totaling about eight months in the 2015 and 2016 cooling seasons across the complex) reveal consumption savings of 550,160.39 kilowatts per hour (kWh), reflecting electric utility cost savings of \$53,430.63—the carbon equivalent of taking about 81 cars off the road. Owners expect even greater savings once an upgrade is made to a cooling tower.

Based on the kWh savings of new HVAC equipment, owners received a \$62,000 rebate from the District of Columbia Sustainable Energy Utility, which further accelerates the owners' return on investment in the new chillers.

For more information, visit www.DaikinApplied.com. MCAA thanks Daikin Group for being a benefactor of MCAA 2017 and providing beverages on Wednesday evening.

CNA

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- Check the corridors, floors, or stairs over your planned route. Check to see the surface is clean and in good condition.
- Carry any pipe, bar stock, or other long objects on your shoulder with the front end high.
- Never change your grip during a lift unless you can support the weight during the grip change.
- If you can't make it as far as you thought you could, stop, put the load down, and rest.

Carrying Material Up and Down Stairs

Workers carry items up and down stairs many times a day. Some points to consider are as follows:

- Be sure handrails, even temporary ones, are in place.
- Check to see how adequate the lighting is even if the job is still under construction. Take extra time on stairways. Make sure there are no loose nails, cans of paint, misplaced claw hammers, or similar objects on the stairs to trip over.
- Walk with your knees and feet pointing outward at an angle while descending stairs, instead of walking with feet and knees pointing straight ahead. Going straight ahead with feet and legs puts unnecessary strain on the knees.

Placing the Material

Placing and storing the material properly is important. Consider these points:

- When possible place the material on tables, sawhorses, or pipe racks that are approximately waist height, thus not having to lower the material to the ground.
- Face the final resting spot for the load you're carrying with your

whole body. Do not twist the load into its final place.

- Don't forget where your fingers and toes are. Allow enough room to place the load so you can move all of you out of the way. Put one corner of a box or similar item down first, so your fingers can be removed from beneath the load.
- Reverse the lifting motion by bending your knees and squatting down with the load, keeping it close to your body, again, without bending your back.
- Before leaving the item(s), test the item(s) for stability where placed.

Pushing and Pulling

While pushing and pulling objects is preferable to lifting and carrying, there is still potential for an injury. Consider the following:

- Push whenever possible instead of pulling.
- Push or pull at waist height and try to avoid bending.
- Be sure you can see over and around the material being moved.
- Avoid steep ramps whenever possible. On all ramps, back down.

Other Lifting Situations

Don't stretch from the ground.

- When lowering an item from shoulder height, push against it first to test its weight and stability. Slide it as close to your body as you can, and hold the item close while lowering it.
- When lifting items from or to high places, use a safe ladder. Do not stand on boxes or other stacked material.
- Rounded objects, such as gas cylinders, drums, and small tanks, can shift suddenly, as their contents may slosh back and forth or the rounded surfaces may begin to roll. Be extra careful.

- Partner lifts can best be accomplished when two individuals who are about the same size pair up. Have lifting signals so you can both move in unison. Good communications is extremely important.

Storing Materials

Where and how material is stored affects both safety and the efficiency on a jobsite. Size things up first and plan ahead when finally storing the material. Instead of just putting material "here and there" on the jobsite, try to use logic as to where materials, tools, equipment, and other items should be unloaded and stored for safety and convenience.

Especially watch the storage of materials in tiers; secure various layers to prevent falling. That includes wood and bricks and skid loads of materials such as tiles, shingles, and plumbing supplies.

The unloading of building supplies can be one of the most dangerous tasks at the work site. Never allow new workers to do the unloading alone. Instead, someone with rigging and mobile equipment experience should supervise unloading and loading activities to assure materials are stored properly. Key suggestions are as follows:

- Store materials, equipment, and tools out of the way, in the most convenient location possible.
- Keep aisles and passageways—outside and inside—from being blocked by supplies. Stored materials must not block exits and emergency equipment.
- Used lumber, when stacked, should have nails removed first.
- Combustible/flammable materials should be stored in a manner that will minimize any fire potential.

They shouldn't be in the way of mobile equipment or in a place where workers might perform any hot work. All smoking should be prohibited. These materials should not be stored where they could possibly impede the exit of any workers in the event of fire. A fire extinguisher must be readily available.

- Scaffolds and work platforms must not be used to store or accumulate piles of material or debris. There should only be as much material stored as can be used by the immediate operations.
- Plan difficult storage moves well in advance. Always arrange stored material in a secure manner.

For more information, visit www.cna.com. MCAA thanks CNA for being a benefactor of MCAA 2017, providing the Final Program and cosponsoring the Dessert Party.

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KEY2ACT

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what their technicians are doing. With seeing comes connection, and with connection comes trust.

"Anytime we can get some more client engagement creates a higher level of trust," said MacDonald-Miller CEO Gus Simonds. "If we can help that building operator make a better decision about something, then I think he'll be more confident about what MacDonald-Miller can do for him."

The ability to better understand the work completed on each job brings another big advantage when the customer gets billed for the work. With MacDonald-Miller, a large site may have 20 to 50 calls in a month, and when the customer reviews a bill to approve payment, they're usually not going to remember what each of the charges was for. With access to pictures and video from each call, they can immediately find out.

Not only does that help customers pay their bills faster, but it's also helping MacDonald-Miller cut down on overhead. For example, MacDonald-Miller has a customer that two technicians typically spend a couple of hours meeting with each month to go over bills and work orders. Most of that time is spent answering questions about individual charges, Eshpeter said.

Now that MacDonald-Miller is using See, those meetings are focused on future projects and potential work that MacDonald-Miller can do for the company. The customer is no longer routinely disputing charges. "They're just paying. They're looking at it, and the bills are being paid," Eshpeter said.

Moving forward, the improved engagement provided by See has the potential to help MacDonald-Miller

reduce customer churn. In real time, it's also helping them attract new customers. Ninety days after they started using the solution, the company landed a huge national account based in part on the fact that MacDonald-Miller was using this technology.

"They said, 'No one's doing this,'" Busick said. "We said, 'Yeah, we know.'"

New Uses Planned

MacDonald-Miller leadership plans to implement a number of additional uses for the smart glasses technology in the near future. Chief among those is the ability to enable real-time troubleshooting between technicians.

With the smart glasses technology, technicians who run into a problem can simply hit call on their phone and connect with a journeyman. Instead of struggling to explain what they're seeing, the technician can share a live feed through the smart glasses. The more experienced tech can then walk them through the fix. A bonus? Those calls can be billed at the higher journeyman rates.

Other future uses could include the creation of training videos, attaching photo and video links to field quotes and maintenance proposals, feeding video to the office from a construction site to show the need for a change order, and more. The technicians and site supervisors themselves will likely be the ones coming up with the best ideas, Olson said.

"As we roll this out to the guys, I'm asking them," Olson said. "These guys are doing the work every day. They're going to have a wealth of ideas."

For more information, visit www.KEY2ACT.com or call 866-KEY2ACT (866-539-2228).

APPION

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recovery cylinder is slowly filled with hot vapor refrigerant, increasing back pressure and greatly slowing down the process.

Enabling a full liquid flow to reach the recovery cylinder using 3/8"-diameter hoses will enable better thermal transfer through the cylinder walls and, ultimately, reduce cylinder pressures and temperatures overall.

"Output restrictions" are points between the recovery machine and recovery cylinder that can increase the back pressure on the recovery machine. Damage to the gauges on the recovery machine or loud "knocking" noises during recovery typically indicate a significant output restriction. Both can be symptoms of rapid pressure spikes caused by the output hose being filled faster than it flows into the tank and can also result in significantly reduced recovery speeds.

Just as with the input side, it's helpful to use larger-diameter hoses and remove unnecessary core depressors.

Additionally, connect the output hose from the recovery machine to the vapor port of the recovery cylinder. This allows the refrigerant to quickly empty into the tank, instead of traveling through the liquid port dip tube, which is often smaller than 1/4" in diameter.

The Greater the Flow, the Faster It Will Go

A recovery machine designed for greater throughput will magnify the symptoms caused by flow restrictions due to greater pressure drops on the input side and higher back pressure on the output side. Buckets of ice only patch up the symptom rather than addressing the causes.

Using larger diameter hoses while removing valve cores and core depressors opens the recovery machine and cylinder up to a full flow of refrigerant, enabling fast, trouble-free refrigerant recovery on every job.

For more information, visit www.appiontools.com.



Rather than forcing refrigerant to travel through the liquid port dip tube, which is often smaller than 1/4" in diameter, using larger-diameter hoses and removing unnecessary core depressors allows the refrigerant to quickly empty into the tank.

EMERSON

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9. Modulation solutions can help regulation compliance.

A cost effective way to meet efficiency standards is by installing tandems. In fact, according to an Emerson survey, 45 percent of contractors expect an increase in sales of tandems and trios as a result of new efficiency standards.

10. New regulations may impact costs, savings, and design.

With higher part-load efficiency (IEER) systems, building owners may experience potentially higher initial costs but lower operating costs. In addition, the industry will likely see several system design updates, including the following:

- Possible larger system sizes due to heat exchanger surface area
- An increased use of modulated scroll compressors, such as two-step capacity scrolls and multiples, as well as variable speed scroll compressors
- Staged fan speeds with variable frequency drives on blower motors

For more information, visit www.emersonclimate.com.

SOURCES

DOE. *Energy Department announces largest energy efficiency standard in history*. Available at <https://energy.gov/articles/energy-department-announces-largest-energy>

efficiency-standard-history

DOE. *Status of state energy code adoption*. Available at <https://www.energycodes.gov/status-state-energy-code-adoption>

The Air Conditioning, Heating and Refrigeration NEWS. *Efficiency standards prompt rooftop innovations: ECM fans, DOAS units emerging as preferred options*. Available at: <http://www.achrnews.com/articles/132707-efficiency-standards-promptrooftop-innovations>

The Air Conditioning, Heating and Refrigeration NEWS. *DOE recognizes organizations for leadership in HVAC rooftop unit efficiency: Combined, these organizations in a single year have saved an estimated 1 trillion BTU*. Available at: <http://www.achrnews.com/articles/132407-doe-recognizes-organizations-forleadership-in-hvac-rooftop-unit-efficiency>

MILLER

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retaining skilled welding operators for Team. The PipeWorx system offers easy setup, an intuitive front panel, and push-button process change-over—making it easier and faster for Team to get welders trained and on the job.

Users can simply push a button to indicate the type of welding needed, and the machine automatically selects the welding process along with the

correct polarity, cable outputs, and welding parameters. The system also changes the shielding gas required. Eliminating the need to manually switch polarity or cables and hoses between processes helps new welders hit the ground running.

“They have enough things to learn already, like techniques and torch angle,” said Mike Schmidt, vice president of manufacturing. “Having a

super machine is one less thing they have to worry about. The quicker we can get people to pass X-ray the better it is for us, and the PipeWorx system really helps us do that.”

That simplicity also provides productivity and efficiency benefits for Team. After a TIG root pass, fabricators can switch to flux-cored for the remaining passes with the push of a button—no need to change cables or gas lines.

“Everything about this machine is just easier,” said Dwayne Tremaine, a Team fabricator who also helps with training. “Simplicity is the key word.”

For more information, visit www.millerwelds.com.



Top: With Miller's PipeWorx 400 welding system, “we have seen a decrease in X-ray failure. The consistency of the arc definitely plays a role in that,” said Jim VanZeeland, shop superintendent of Team.

Bottom: Team appreciates that the PipeWorx system offers easy setup, an intuitive front panel, and push-button process changeover. “Everything about this machine is just easier,” said Dwayne Tremaine, a Team fabricator who also helps with training.

HONEYWELL

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not adequately remove moisture and noncondensables such as air. Use a good electronic gauge to measure the vacuum. An accurate reading cannot be made with a refrigeration gauge.

- To avoid overcharging, it is best to charge the system by first measuring the operating conditions (including discharge and suction pressures, suction line temperature, compressor amps, superheat, subcooling) instead of using the liquid line sight glass as a guide.

For more information, visit www.honeywell-refrigerants.com or call 800-631-8138.

You can watch a step-by-step guide to the retrofit process, “Genetron® 422D: The No-Oil-Change R-22 Retrofit Solution for A/C,” on YouTube at <https://www.youtube.com/watch?v=4y5WqK2uNLU>.

Rawal's APR Control Modulates Humidity, Stops Mold Invasion in Mixed-Use Space

To combat the signs of mold and mildew growth, a Southeastern U.S. house of worship installed the APR Control manufactured by **Rawal Devices, Inc.** to eliminate the humidity causing the problem. Thanks to the new control, the organization avoided major health effects and was able to restore its facility to full use.

Mold in Mixed-Use Spaces

The most consistent problem that mixed-use facilities—such as houses of worship, community centers, correctional facilities, sports complexes, theatres, and public buildings—face is the varying load conditions caused by constant shifts in occupancy. When direct expansion (DX) air conditioning (AC) equipment is applied to these types of facilities, it is designed for peak load conditions, which includes full occupancy and the necessary ventilation. Constant shifts in occupancy result in temporarily oversized AC equipment, leading to temperature and humidity swings, mold growth, short cycling, hard starts, coil frosting, liquid slugging, and ultimately the possibility of equipment failure.

This particular organization was a prime example of how a mixed-use facility can be affected by varying load conditions and oversized DX AC equipment. The large facility houses a preschool program, kids' play room, nursery, childcare services, workout facility, and conference room in addition to the area where the congregation gathers for worship.

The facility is serviced by multiple DX AC systems that were unable to adapt to the constant shifts in occupancy. Several rooms, including the workout facility, kids' play room, and conference room, were becoming extremely uncomfortable, and the maintenance staff started seeing signs of mold and mildew growth on the walls and ceilings.

High Humidity Identified as Cause

The mold growth and threat of viruses spreading throughout the facility caused the staff to shut down the rooms to protect the health of facility users. It was determined that high humidity was causing the mold growth. According to the Environmental Protection Agency (EPA), humidity levels

should be kept within 30–60 percent indoors (ideally 30–50 percent) to decrease or prevent mold propagation. The facility was experiencing relative humidity levels between 70 and 80 percent—well above the EPA's recommended levels.

It was determined that the constant shifts in occupancy in the spaces caused the DX AC system to short cycle. These inadequate run times lead to high humidity levels, ultimately resulting in mold growth. ASHRAE studies show that it takes an AC system approximately 15 minutes of run time with the evaporator coil temperature below dew point to begin useful moisture removal.

APR Control Stabilizes Humidity

Before the mold took root and became a considerable threat to members, the organization decided to install the APR Control, a continuous capacity modulation and dehumidification device manufactured by Rawal Devices since 1993. The APR Control allows a standard DX AC system to modulate its capacity to match changing load conditions to extend the system's run time for better dehumidification capabilities.

The APR Control provided capacity control for the DX AC system. A humidistat was also installed to create an active dehumidification cycle. The APR Control helped lower and stabilize the humidity levels by matching the system capacity to the changing load conditions, thus preventing further mold growth. Additionally, the APR Control prevented other possible complications of DX systems.

The maintenance staff at the organization recognized that mold in itself poses a threat. Moreover, the costs of major repairs to the space, possible loss of rent, potential occupant relocation costs, and the possibility of litigation are significant concerns for any building owner. By installing the APR Control, the organization was able to avoid these issues, maintain a healthy environment, and return to normal daily operations.

For more information, visit www.rawal.com or call 800-727-6447.



Looking for a smart solution to your latest business challenge? The members of MCAA's Manufacturer/Supplier Council can help!

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