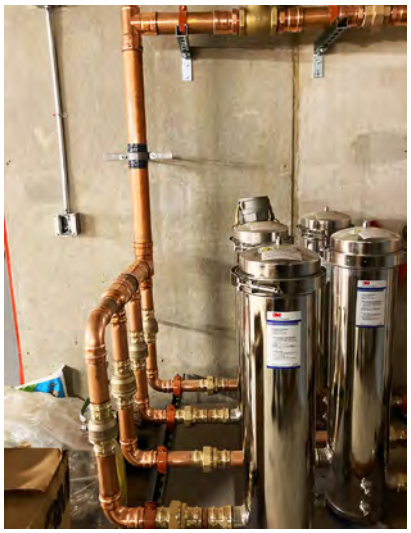
SMART SOLUTIONS

Helping contractors save money and enhance productivity

SUMMER 2021

Olson Plumbing and Heating Weathers Challenges of Pikes Peak Project with Viega ProPress

Prefabrication was just one of the ways that Olson Plumbing and Heating leveraged Viega ProPress to take on a mountain of a project: building a new visitor's complex at the summit of Pikes Peak that met strict environmental standards … during the COVID-19 pandemic. "We prefabbed all the domestic and hydronic piping, as much as we could, to minimize labor at the top," said Josh Crippen, superintendent at Olson. "We prefabbed our pump skids, all the water heater and boiler skids, all the waste and vent piping. As much as possible."



By using Viega ProPress fittings throughout the Summit Complex, Olson managed to get all the plumbing and piping in place in the short window of time allotted during the summer of 2020.

Building the new Pikes Peak (Colorado) Summit Complex, situated at 14,110 feet in elevation, put Olson crew members at the highest ongoing construction site in North America. The challenge of simply breathing at 14,000 feet in elevation, where the air is exceptionally thin, is tough enough. But add in the manual work done on a construction site, plus weather and COVID-19 precautions, and the jobsite becomes exceptionally challenging. Workers had to pass full physicals; they were equipped with

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McKinstry Specifies Uponor Products to Save Energy and Installation Time

School Solves Persistent Heat-Loss Problems, Cuts Energy Costs by Using Ecoflex Preinsulated PEX Piping

Following an energy audit, McKinstry specified Uponor's flexible Ecoflex preinsulated piping to resolve a remote Minnesota school's longtime heating problems and save the school thousands in energy costs. Ecoflex proved easy to install, allowing workers to lay hundreds of feet of piping in just one week.

Heating System Headaches

Wolf Ridge Environmental Learning Center in Finland, MN, is a nationally accredited K–12 school and residential educational center for outdoor learning adventures. The campus, which spans more than 2,000 acres of forests, inland lakes, and streams, is located in one of the northernmost areas of the nation—where winter temperatures can fall well below zero for months at a time and snowfall accumulations can total more than 100" for the season.

The Uponor Ecoflex piping called for by McKinstry was easy to install. Workers laid 950' of piping in one phase of the Wolf Ridge repiping project and 1,350' in a second phase, both in just one week.

The first buildings constructed on the site included two classroom buildings,

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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
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Adding Value to Your Supply Chain

Overcoming Challenges

This issue of *Smart Solutions* highlights new technology, products, and services to help meet continuing labor and other challenges in the industry. For example, by using FARO Technologies Inc.'s new laser scanners, one Limbach worker can capture in a few hours what used to take a team of people to complete in a week. Limbach also adopted MSUITE's FabPro software in a pop-up fabrication shop, minimizing assembly and installation time and completing the project two months early.

Atomatic Mechanical Services Inc. credits XOi Technologies with helping them manage their workload with existing personnel rather than hiring more people. With Procore software, Monterey Mechanical Co. increased efficiency, saving one day a week of work per employee. Because Boston Children's Hospital used Marking Services Inc.'s products to keep track of documents for thousands of facility assets, they were able to access needed warranty information easily, saving money.

Investing in time-saving products paid off for CRW Mechanical, which won a project bid by switching to a Milwaukee® Long Throw Press Tool that slashed labor costs. Piping Systems Inc. bought a Watts-Mueller cutting system to reduce cutting times and gain a competitive advantage. Bayer's Plumbing used MIFAB's modern grease interceptor solution to keep costs and installation time down for a restaurant renovation. Installing Marley® Cooling Towers from SPX Cooling Technologies, Inc., Wayne Crouse, Inc. shaved several days off of the schedule for a challenging hospital project.

Join me in welcoming our newest supplier partners:

- **BuildOps**
- **DADO, Inc.**
- **Discovery Sound Technology**
- **PypeServer, Inc.**
- **Tyfoom, LLC**
- **United Rentals**

For a demanding new warehouse project, Current Mechanical counted on Victaulic's experienced virtual design and construction team, fabrication services, and grooved mechanical couplings to save installation time when its workforce was stretched thin. Olson Plumbing and Heating leveraged Viega ProPress to take on a mountain of a project: building a new visitor's complex at the summit of Colorado's Pikes Peak.

Members are meeting customers' demands with energy-efficient products. For example, Daikin Applied helped a medical center update its aging HVAC infrastructure and secure a $160,000 energy-efficiency rebate from the local utility provider. Following an energy audit, McKinstry specified Uponor's flexible Ecoflex preinsulated piping to resolve a remote Minnesota school's longtime heating problems and save the school thousands in energy costs. A community college installed new Lochinvar boilers to meet its ambitious energy-reduction goals.

This issue also features technical insights from Sloan on upgrading water systems, from IMI Hydronic Engineering on climate control, and from Wieland Chase on the effectiveness of dezincification-resistant brass. We hope you will take advantage of our manufacturer/supplier partners' knowledge and expertise to help you improve productivity and increase profits.

Christopher Catania, Chair

Victaulic and Current Mechanical Achieve Perfect Harmony on Ambitious Expansion Project

Victaulic Products and Expertise Help Current Overcome Labor Shortage to Meet Tight Timeline

For a demanding new warehouse project with a nine-month timeline, Current Mechanical counted on Victaulic's experienced virtual design and construction (VDC) team, fabrication services, and grooved mechanical couplings to save installation time even as its workforce was stretched thin. "With the labor shortage, I am not sure we would have been able to complete this project without using Victaulic's fabrication services," said Steve Lewis, project manager at Current Mechanical.

Lewis continued, "Victaulic was able to model the room, create 3D installation drawings, and assist with spatial challenges when they arose with other trades as the project progressed. The biggest advantage to using Victaulic's fabrication services was that we were able to reduce manpower and save critical time by allowing the construction crew to spend its time focusing exclusively on installing the piping system."

Scaling Up With Control

In 2019, Sweetwater Sound, Inc. planned to expand its Fort Wayne, IN, campus by building a new 500,000-square-foot warehouse. Sweetwater began in 1979 as a recording studio in a Volkswagen bus and has since become the largest online retailer of musical instruments and professional audio equipment in the United States.

Storing musical instruments requires a climate-controlled environment, so maintaining appropriate conditions within the warehouse was critical. High humidity and fluctuating temperatures increase the risk of cracks, corrosion, and broken strings, so precise control is vital to preserving the integrity of the instruments in storage.

The project also had to be completed in just nine months, which was a challenge because of its large scope of work, including six air handling units (AHUs) with humidification; two chillers; a two-cell cooling tower; three boilers; heating, chilled, and condenser water pumps; an air piping system for conveyor systems; a domestic water system; and a reverse osmosis system for humidification.

The system installed also had to be scalable to accommodate future warehouse expansion. The initial concept was to build a giant central plant that answered the immediate needs of the facility but that was constructed so it could be expanded to meet the higher loads required to adequately control humidity and temperature in a larger space as more demand was made on the system.

Making Music Together

The contract was awarded to Current Mechanical, a Fort Wayne-based contractor that specializes in refrigeration, plumbing, HVAC, process piping, medical gas piping, and fire protection services. Current Mechanical had a solid track record with Sweetwater, having previously completed work for two other warehouse facilities, as well as its corporate office in Fort Wayne.

Although Current Mechanical had worked with Sweetwater before, the company had not installed the type of humidification system that was required for this new-build warehouse. Additionally, they were also undertaking this project at a time when their workforce was stretched thin. Current Mechanical needed a partner that could expedite and simplify installation to relieve some of the pressure on its limited crew and provide fabrication to facilitate site work.

Current Mechanical's successful partnership over the past 15 years with Victaulic, the leading

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Top: To complete Sweetwater Sound's demanding storage expansion project in just nine months, Current Mechanical employed Victaulic's grooved products, design expertise, and fabrication services to overcome its workforce shortages. **Bottom:** "The biggest advantage to using Victaulic's fabrication services was that we were able to reduce manpower and save critical time by allowing the construction crew to spend its time focusing exclusively on installing the piping system," said Steve Lewis, project manager at Current Mechanical, of the Sweetwater Sound storage facility project.

CRW Mechanical Wins Bid with Labor-Saving Milwaukee Press Tool

CRW Mechanical won the bid for a parking garage's gas piping project by switching to a Milwaukee® M18™ Force Logic™ Long Throw Press Tool rather than using a traditional all-weld approach. The Press Tool saved CRW Mechanical 15 percent on the project's labor costs, and the crew saved 125 hours—all with just one Long Throw Press Tool onsite.

For CRW, located in the Washington, DC, area, the project "wins" include the following:

- The Long Throw Press Tool decreased labor costs by 15 percent compared with an all-weld job, allowing CRW to reduce its original bid and win the job.
- The lower bid allowed the Columbia Gas utility to green-light the large gas pipe project, which had been on the back burner for years.
- The crew on the jobsite saved 125 hours using just one Long Throw Press Tool, completing each fitting in seconds.

The Press Tool installation meant a gain of about 25 minutes every time one of the job's 300-plus Viega® MegaPress® XL® fittings was installed. In total, the Press Tool saved the CRW crew 125 hours—more than five days—on the project.

Work started during the COVID-19 pandemic, but Columbia Gas of Virginia had been eyeing the large undertaking for years. The parking garage, located at a Worldgate Plaza office building in Herndon, VA, was built in the 1980s with indoor gas meters. The utility needed the meters moved to the exterior.

Utility managers were motivated to get the long-delayed project done. A Columbia Gas line had been placed on the property five years earlier, and the line was just sitting there—dead. The utility contacted CRW and asked for a price. However, CRW's original bid for an all-weld project was considered too high.

Pivoting to Press Tools

Rudy Ford, president of CRW, was evaluating solutions to get the deal done when he viewed a Milwaukee Innovation display during a socially distanced mini-trade show sponsored by the Mechanical Contractors Association of Metropolitan Washington. Talking to Sales Representative Hyojon Robbins at the event, Ford saw 4" cordless "jaws" on a table. Ford commented, "Wow, that's ProPress for copper," and Robbins replied, "No, that's up to 4" MegaPress for steel."

Inspiration struck Ford. Milwaukee's products were the solution for the parking garage project. Robbins confirmed that the tool is fully compatible with 2½" to 4" Viega MegaPress XL fittings for steel pipes. Ford said, "I literally left the tool display, came back to the office, and repriced the job that same day based on labor savings." Robbins worked with Viega to go over the features and benefits of the tool, and Ford consulted with partners at Viega, too.

"I wanted my guys to work," Ford said. "It was during COVID-19, so the garage was empty. We needed the work, and this was an opportunity to make the price attractive to Columbia Gas."

Ford lowered the bid 15 percent based on labor savings alone. "We just went for it," he said.

Savings Plus Safety

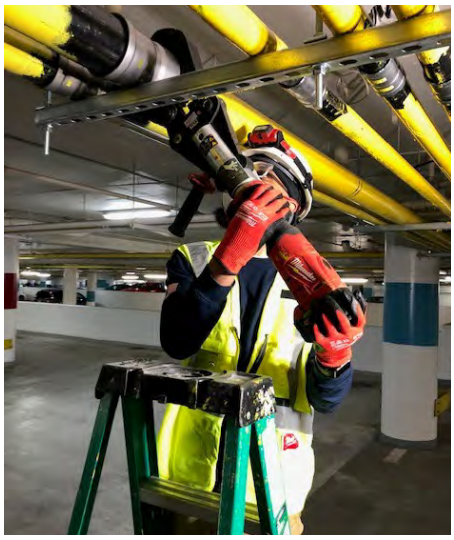
Because welders use an open flame even in tight spaces, a hot work permit is required, along with a second person for fire watch. These steps are not needed with the Press Tool, and neither are materials such as welding gas, filler material, torches, or cords. With welding, a wet system must be drained. The Press Tool using XL rings connects wet systems, skipping the draining stage and saving time.

Even during COVID-19, a few dozen cars were parked in the garage. Safety precautions in an open, active parking garage include protecting vehicles by cordoning off areas. Screens are set up to shield pedestrians from possible arc flash. Smoke and exhaust from welding must be cleared out of the air. Because CRW used the Long Throw Press Tool, none of those precautions were needed on the jobsite.

CRW Foreman A. J. Hodges summed up the advantages of the new approach. "We worked with 5,000' of pipe on 19 different lines. Pressing made the whole job easier. The Press Tool made a dramatic difference to me and the work, plus it was easy to use," said Hodges.

Hodges, a welder, put the project finish time into perspective. "If I had been welding, I'd only be a quarter of the way done." He confirmed that no gas leaks were found in presses made on the 5,000' of pipe. Ford added, "The gas company likes the results. They take pictures every time they're out there."

For more information, visit www.milwaukeetool.com. MCAA thanks Milwaukee Tool for being an MCAA sponsor.



For a parking garage project, using a single Milwaukee M18 Force Logic Long Throw Press Tool saved CRW Mechanical 15 percent on labor costs, and the crew saved 125 hours overall.

Wayne Crouse, Inc. Cuts Installation Time with Marley Cooling Towers

Installing Marley® Cooling Towers from SPX Cooling Technologies, Inc., Wayne Crouse, Inc. shaved several days off of the schedule for a challenging project at a large university medical center in Pennsylvania. Extensive advance planning and coordination with the hospital, contractors, and trades was key.

Wayne Crouse, Inc. shaved several days off of a tight schedule by installing Marley Cooling Towers at a large university medical center—a challenging project complicated by the need to ensure that the medical center could provide services uninterrupted during the COVID-19 pandemic.

The 500+-bed medical center's multiyear master plan required a central plant expansion and replacement of the cooling towers. This complex project included a number of demanding requirements:

- New towers must operate more quietly than existing systems to address neighborhood concerns.
- Cooling systems must continue to operate throughout the replacement process.
- Construction must avoid peak heat load seasons.
- New towers must fit into the existing central plant space and tap into existing piping connections.
- Access to the emergency department, directly adjacent to the construction site, could not be closed; there must be zero interruptions for ambulances.
- The installation process had to navigate beneath an existing parking structure before being hoisted atop the plant.

Marley Cooling Towers were specified by consulting engineers BR+A and Barton Associates, Inc. to meet the hospital's requirements for quiet operation, reliability, and redundancy with capacity to allow for future expansion. The general contractor, Turner Construction, chose Pittsburgh-based mechanical contractor Wayne Crouse, Inc. for the challenging installation.

The general contractor's logistics partner, SourceBlue LLC, procured the cooling towers well ahead of the construction schedule. Wayne Crouse, Inc. staged the towers in a rigger's yard, which allowed product delivery to the construction site precisely when required and greatly reduced road closures that would impact access to the hospital's emergency department.

The cooling tower replacement was accomplished in two phases. Phase one, replacing four Marley cooling towers in service since the 1980s, was completed in spring 2020, ahead of peak summer heat. Phase two, completed in spring 2021, replaced five newer cooling towers from another manufacturer that were noisy and showed early signs of corrosion and deterioration. Future central plant expansion phases will include chiller replacement.

Wayne Crouse prefabricated piping and valving at their facility and successfully placed all phase-one towers (four cells/eight modules) in position within two days. Similarly, phase-two towers (five cells/ten modules) were placed within three days' time.

"There was a good flow of information among the players, and the lessons learned in phase one helped us to beat expectations for phase two. Phase two went even more smoothly, and we reduced rigging from the five days planned to three days," according to Shawn Bell of Turner Construction.

For more information, visit www.spxcooling.com.

Daikin Magnitude Chiller & Optimized Controls Save Hospital More Than $70,000 per Year

When it came time for Luminis Health Doctors Community Medical Center (LHDCMC) of Lanham, MD, to update its aging HVAC infrastructure, it quickly awarded the business to the Daikin Applied team in Washington, DC, which has helped the hospital meet its patient care and comfort needs for years. The project leads helped LHDCMC secure a $160,000 energy efficiency rebate from the local utility provider, and the updates will save the facility over $70,000 per year in energy costs. The work had to be completed in the midst of a shutdown necessitated by the COVID-19 pandemic.

Founded in 1975 by a team of physicians committed to improving local access to care, the center provides medical and surgical services to residents in Anne Arundel and Prince George's counties in Maryland (suburbs of Washington, DC) and across the state's Eastern Shore. It joined the Luminis Health system in 2019 to form LHDCMC and is a nationally recognized nonprofit hospital that has grown into an ultramodern operation with more than 200 beds.

Just after the Daikin chillers and cooling towers were set in place, Maryland initiated a COVID-19 shutdown, but the Daikin Applied team completed the installation with minimal disruption to the hospital.

To minimize the effects of the HVAC overhaul on patient care and staff productivity, the project was divided into phases. Phase one was slated to take place during the winter months to help moderate the demand on the equipment for chilled water. Phase two was scheduled for summer to help reduce the demand on the hospital's boiler for steam and hot water. "I have never worked with a group that is so efficient and can get things done with minimal disruption," said Jerry Dyer, LHDCMC's director of Plant Operations.

The turnkey package included new air- and water-cooled chillers, hot water and steam boilers, cooling towers, chilled and condenser water systems, hot water pumps, and chiller and boiler plant controls. The Daikin team partnered with an MEP engineer to ensure an efficient and code-compliant design. In addition, the team employed seasoned partners in the mechanical, electrical, and controls trades to ensure a high-quality outcome.

The solution included Daikin's Magnitude® magnetic-bearing WMC and Pathfinder® AWV chillers to form a hybrid that uses a combination of air-cooling technology in the winter months and water-cooled technology in the summer months to meet hospital loads. Magnetic-bearing technology eliminates oil, mechanical seals, wear surfaces, and gears, resulting in longer machine life and increased reliability.

Using direct drive technology, integral variable-frequency drives, and ozone-friendly R134a refrigerant, the Magnitude chiller can be up to 40 percent more efficient than standard centrifugal chillers. The variable drive responds according to cooling demand rather than operating at a constant rate. The award-winning Pathfinder is one of the most efficient air-cooled screw chillers on the market. It features proprietary, variable-volume ratio®, single-rotor compressor technology and fully-variable-speed ECM condenser fan motors. Further, the chillers operate quietly and reliably—ideal for the health care environment.

To further optimize energy consumption, the Daikin team specified a state-of-the-art controls platform, leveraging the latest techniques for running the chillers and accessory equipment at the lowest energy consumption rate possible. The controls also provide facility operators with real-time energy data in terms of kilowatts per ton of performance.

In the midst of the carefully-timed schedule—but just after the chillers and cooling towers were set in place—Maryland initiated a COVID-19 shutdown, except for essential services. Daikin Applied and its dedicated partners worked to finish the project with a renewed sense of urgency and care. The upgraded HVAC system, with magnetic-bearing chillers and controls optimization, will cut LHDCMC's energy use to 23 percent of the current chiller plant consumption.

For more information, visit DaikinApplied.com.
MCAA thanks Daikin for being an MCAA sponsor.

Installing Daikin's Magnitude magnetic-bearing WMC and Pathfinder AWV chillers earned Luminis Health Doctors Community Medical Center a $160,000 energy efficiency rebate and is projected to save the facility over $70,000 per year in energy costs.

Sloan's Keys to a Successful Water Savings Project

By Mark Lawinger, Senior Product Line Manager for Flushometers and Fixtures, Sloan

You have probably heard about "the five Ps:" Proper planning prevents poor performance. This concept is particularly important when embarking on a commercial retrofit project to reduce water consumption.

Whether it is to gain LEED points, meet regulatory requirements, save on utility costs, or contribute to a larger green initiative, there are multiple benefits to upgrading outdated plumbing fittings and fixtures. Thanks to advancements in commercial plumbing technology today's commercial restrooms use only a fraction of the water compared with systems from decades past.

It can be tempting to simply specify new high-efficiency equipment, calculate the gallons saved per fixture, count the fixtures, and multiply to get the expected water savings. In a perfect world, that is all that would be needed to get started. But a lack of planning can cause problems. The best way to avoid unexpected results is to thoroughly investigate the existing plumbing system before specifying any components or making calculations.

Unlike new construction, with a retrofit project, the contractor does not have every detail of the plumbing system meticulously documented in the mechanical plans. Retrofit projects mean installing new equipment with different specifications into existing—and often unknown—conditions, both upstream and downstream from the fittings and fixtures. It is important to talk to the people who know the system, such as building owners, facility managers, and maintenance personnel—anyone who knows the history of the building's plumbing.

Step 1: Conduct the Assessment

Conducting a thorough assessment means inspecting the plumbing system and measuring as many performance variables as possible. Information should be gathered from three key areas: upstream, downstream, and at fixtures and valves.

Upstream

Pressure (static, dynamic, pressure over time)—Static pressure readings are a good starting point, but they are not the "tell-all" for the health of a system. Static pressure, working pressure, and recovery (the time for the system pressure to return to the static readings) are vital to determining a system's response and capacity. Very high static readings (above 80 psi) can be a warning sign, pointing to failing pressure-reducing valves (PRVs) or, much more concerning, a volume or capacity problem.

Piping diameter—It would seem logical that by taking the

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1880s	1920s	1974	1992	TODAY
High-tank toilets used around 10 gallons per flush (gpf)	Introduction of the standard tank toilet that used 5–7 gpf	The first 3.5 gpf toilet hit the market	Energy Policy Act mandated 1.6 gpf for toilets and 1.0 gpf for urinals going forward	Exceptional performance can be achieved with as little as 1.1 gpf

Commercial plumbing technology has greatly improved over time and now requires considerably less water.

VEIGA

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personal oxygen cans and watched each other closely.

"Any given day, you can almost guarantee that somebody on one of the crews—whether ours or someone else's up there—would get altitude sickness," said Dom Wilson, field foreman for Olson. "We worked in the buddy system so you could recognize if your partner was not feeling well. What you think is a slight headache is really an attack of the altitude, and you need to get down to 11,000 feet and be evaluated by an EMT."

The Summit Complex will replace the Summit House, built more than 60 years ago, and at 38,000 square feet, the new build involved a lot. For contractors who had the ability, prefabrication of anything possible at a lower elevation was all but a necessity.

Pressing Matters

The folks at Olson will tell you they use Viega ProPress as often as possible, but using it on a job like the one for "America's Mountain" was extra important. Viega's press technology requires no soldering, welding, or threading. Connect your pipes with a press fitting, use a battery-operated press tool and jaws to complete the press in seconds, and move onto the next joint. It is fast, clean and simple.

Prefabricating with Viega ProPress meant that the Olson crew spent less time working at altitude to complete the Pikes Peak Summit Complex, where the air was thin and the weather potentially dangerous.

For the Olson crew, the ability to prefab so many of the pieces at their shop in Colorado Springs meant there was less work to do at altitude. Sections of pipe were trucked up the mountain on special trailers purchased by the general contractor, GE Johnson Construction Company. Crippen said the trailers had movable axles to get through the switchbacks on the steep road to the top.

Viega certifies many of its products, including ProPress, to the stringent LBC requirements, so Olson was confident that the products they used for the Pikes Peak Summit Complex would meet the LBC standards.

But before Olson could even think about putting together sections of pipe using ProPress, they first had to pass special specifications. The Summit Complex was constructed to meet the Living Building Challenge (LBC), one of the most rigorous proven performance standards for buildings. Olson and the other subcontractors had to undergo a strenuous submittal process to ensure their products were accepted by the LBC. Viega certifies many of its products, including ProPress, to the stringent LBC requirements.

Extreme Construction Conditions

Work on the new Summit Complex began in 2018 when existing central utility plants were demolished and a temporary utility plant for blackwater was installed to keep the old Summit House operational during construction of the new building, about 100' away.

"Midsummer was a big race to get all of the in-floor heat in and get the foundation done and the building footprint excavated," said Crippen. "We were really close—three weeks before the weather shut us down."

Regular Colorado weather, which can fluctuate from 30º F to 70º F in a day, pales in comparison to the weather at the top of a fourteener (what Coloradans call the state's 58 peaks that are 14,000' or higher) like Pikes Peak. While the temperature in Colorado Springs near the base of the mountain might be 30º F and sunny, the summit temperature is likely to be −20º F with howling winds and nothing to stop them.

With potentially treacherous weather conditions, crews working at the summit had to be on their toes all the time. Crippen described spring and summer lightning storms as "unbelievable" and noted that when lightning appeared within 20 miles, everyone had to shelter in place to stay safe.

The added curveball of COVID-19 safety restrictions complicated the project further. The logistics of getting everyone up the mountain safely, with vehicle capacities and mask requirements, was tough. Olson's crews began plumbing and piping in the summer of 2020. With a short window to get everything to the peak and in place, the clock was always ticking in the background.

Viega Solutions

For the wastewater treatment facility at the summit, Viega ProPress Stainless connects the settling tanks and reclaimed water system. Blackwater is captured and

treated through a chlorine ultraviolet light filter process. After about a year, the graywater can be reused to flush the toilets in the Summit Complex.

"This is not like your average gravity system for drainage!" said Crippen. "It's a vacuum system like in an airplane or cruise ship. It's part of the LBC and the green building, to be able to reuse materials. This build will be the first of its kind."

Settling tanks at the peak separate the waste solids, which are pumped out to a truck (through copper with ProPress fittings) and taken down the mountain. The rest goes into other settling tanks where the treatment process begins.

Inside the Summit Complex are 37 water closets and 18 hand sinks. All of the bathroom facilities are serviced through copper with ProPress fittings. The entire building is heated from two electric boilers with 12 zones of in-floor heat, and the heating water is also supplied via ProPress. The building has three sump pits to handle what Mother Nature provides, and that runoff water is pumped out through copper and ProPress as well.

Each year, more than half a million people visit the summit of Pikes Peak. The new three-story Summit Complex will feature a large walkway as well as multimedia exhibits to tell the story and history of the mountain. These indoor and outdoor exhibits will also educate visitors about the climate and geography, recreational opportunities, and conservation initiatives—like those of the LBC.

Final construction work was completed at the Summit Complex in early 2021, and visitors were welcomed on June 24.

For more information, visit www.viega.us. MCAA thanks Viega for being an MCAA sponsor.

FARO's Laser-Based Reality Capture Tools Cut Limbach's Labor Costs

New Technology Opens Doors to New Business Opportunities

FARO Technologies Inc.'s FARO® Focus S 350 Laser Scanners "are really allowing us to send one guy in to a project and capture in a few hours what a team of people used to do over the course of a week—field measuring, documenting, etc.," said Mark Lamberson CPD, national virtual design and construction manager of Limbach Holdings Inc.

Limbach reaped the benefits of reality capture technology's significant advantage over traditional measurement devices in terms of speed and accuracy when they completed a 3D laser scanning project earlier this year for a meatpacking business in downtown Detroit.

By taking the initial steps in embracing a service-side reality capture component, the company documented the site and provided Revit® models to ensure that a new piece of bulky equipment would fit in the physical space. This type of documentation is especially important in cities like Detroit, where century-old physical structures lack their original blueprints, and even in newer buildings, where upgrades and additions no longer match what was first constructed.

Earlier this year, in addition to two FARO scanners, Limbach purchased FARO's SCENE Software, As-Built™ Software, and WebShare Cloud, a suite of three programs ideal for site documentation for building structures as well as plant and MEP systems that include piping or HVAC. Combined, the hardware and software solutions have helped the $568-million revenue company streamline costs, enhance the efficiency of their workflows, accelerate project completion, and, perhaps most importantly, navigate the ongoing health and safety restrictions related to COVID-19.

With FARO's laser scanners and software, one person can "capture in a few hours what a team of people used to do over the course of a week," said Mark Lamberson CPD, National Virtual Design and Construction Manager for Limbach Holdings Inc.

"COVID has required organizations, especially those like construction that are so labor-intensive, to rethink certain processes of their business," said Kipp Ivey, a FARO applications business development manager who has been a technical advisor to Limbach for the past 10 years. "You think about it, certain states have restrictions to prevent access to particular facilities. Even certain companies now have the authority or right to determine how many people are allowed in a structure or building at any given point. COVID has now made companies think, 'How do we mitigate human interaction and minimize the number of people that have to go onsite?'"

Post-COVID Building Prospects

Even as material costs for lumber are up from last year and logistical logjams challenge numerous supply chains, federal stimulus money combined with pandemic savings has increased opportunities for the engineering and construction industry. For companies like Pittsburgh-based Limbach, taking advantage of those opportunities

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UPONOR, INC.

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an administration building, a dining hall, and a dormitory, totaling 61,000 square feet. All the buildings, with the exception of the Science Center, were heated via four 3,200-gallon cordwood boilers in a remote district heating plant located approximately 500' north of the dining hall. Each boiler featured a simple aquastat controller to circulate the energy through the underground loops.

An underground fiberglass piping network distributed hot water to heat the buildings through air-handling coils. The fiberglass pipes were insulated with ½" urethane foam and covered with polyethylene black plastic wrap. The Science Center building was heated via an in-slab hydronic radiant floor heating system that received local electric off-peak energy for the heating supply source. The Science Center could not be part of the underground distribution loop because the ground was complete bedrock and would have required additional soil to bury the district heating piping.

The entire district heating system seemed to work well upon initial installation. However, over the first winter, the heat loss to ground was so significant that it melted the snow pack above the distribution lines. So, Wolf Ridge placed 2" polystyrene foam above sections of the piping system that were experiencing the greatest heat loss. Although this initially helped, within a few days into the heating season, the heat-loss problem was again obvious—as demonstrated by a melted path in the ground.

A few years later, Wolf Ridge added a second dormitory. This time, instead of using fiberglass for the underground distribution loop, the center decided to try another product it hoped would offer better insulation. The product,

McKinstry specified Uponor's Ecoflex preinsulated PEX piping to resolve persistent heat retention problems at Wolf Ridge Environmental Learning Center in Finland, MN, where winter temperatures can fall well below zero for months and seasonal snowfall accumulations can total more than 100".

Uponor's Ecoflex, featured PEX service pipe surrounded by PEX foam insulation and covered by a corrugated HDPE jacket.

The product allowed increased flexibility because the different layers could "move" independently from one another. It also allowed easier accessibility to the service pipe because the PEX foam insulation was not adhered to the service pipe. The project used 1,223' of 2½" Ecoflex to supply district energy for heating and domestic hot water to the 23,000-square-foot east dormitory.

Systemwide Solution Needed

Fast-forward 12 years. The Wolf Ridge district energy system needed an upgrade. "We knew we had a problem with heat loss and aging boilers," said Pete Smerud, executive director of Wolf Ridge. "However, we needed documented data to prove the inefficiency of the fiberglass system as well as the viability of the district energy system."

Bernie Eikmeier, program manager of McKinstry, was asked to perform an energy audit of the system. For three weeks, Eikmeier tested the heat loss of the fiberglass and flexible preinsulated systems to gather data. His results showed the flexible preinsulated pipe experienced an average of 15-percent heat loss while the fiberglass pipe experienced an average of 60-percent heat loss. McKinstry estimated that by repiping with Ecoflex, Wolf Ridge could reduce its energy consumption by 20 percent annually, saving approximately $6,400 in annual fuel supply costs.

District Energy vs. Distributed Heat

After deciding on the product to use for the underground distribution piping, Wolf Ridge also needed to consider which application would be best. The center considered several options provided by McKinstry during the energy audit. Based on McKinstry's recommendation, management decided to upgrade the existing boilers and replace the distribution system.

Gulbranson Excavating of Eveleth, MN, dug the trenches for the new pipe, and Shannon's Plumbing of International Falls, MN, along with members of Wolf Ridge staff and engineers from Uponor, installed the Ecoflex system. The project included

340’ of 2” supply and return pipes in a single jacket and 610’ of 3” single pipe in a jacket.

The Ecoflex pipes came in long coil lengths up to 600’, which meant the installers did not need to stop often to make connections. They used a large uncoiler to lay the pipe in the trench efficiently in just one week.

McKinstry recommended mounding the backfilled material over the pipe to distribute surface water runoff, which was especially important as springtime water percolating through the soil created some of the most challenging conditions with the fiberglass pipe.

When it came time to install the second phase of the repipe for the west dorm and education building, the consistency of the Ecoflex system allowed a fast, efficient installation that met the same one-week construction schedule. The west dorm repipe used 180’ of 2” supply and return pipes in a single jacket and 1,170’ of 4” single pipe in a jacket.

The whole installation went very smoothly, and the installers were able to finish the project within the tight timeframe. Because Wolf Ridge is a 24/7 operation, the installation speed was crucial to the success of the project.

Uponor’s Ecoflex preinsulated piping, proposed by McKinstry, comes in long coil lengths up to 600’, so workers did not need to stop often to make connections during installation.

The first winter after the installation, Wolf Ridge saved approximately $7,000 in fuel supply costs—just on the wood alone. The consumption of wood dropped 21.5 percent from a yearly average of 200 cords to 157 cords—and that was during an extreme winter. Reducing consumption by 43 cords per year offered Wolf Ridge an annual savings of approximately 190 birch trees (140,000 lb.) and 860 million British thermal units (MBtu). The energy cost savings were even greater when adding in reduced labor costs of feeding and removing the ashes from the wood-fired boilers.

An Education in Energy Efficiency

Following the repipe, Wolf Ridge replaced the cordwood boilers with two new biomass wood pellet boilers to bring even greater energy efficiency to its campus. The new system is a pressurized, closed-loop system operating at 22 psi. The old cordwood boilers were only operating at 50 percent of their maximum efficiency because of corrosion buildup on the heat exchanger. The new boilers increased capacity by 58 percent from 1.9 MBtu to 3.0 MBtu while reducing the volume of water needed to store the energy by 75 percent (without including the distribution system volume).

Before Wolf Ridge replaced the distribution piping, the district heating system supply temperatures were around 105° F because of heat loss to the ground. With the new wood pellet boilers and distribution system in place, the system supply temperature is set at 160° F.

In addition to its new district energy system, which now includes domestic hot water, Wolf Ridge has added a solar thermal domestic hot-water system, working in concert with the biomass in the east dorm. The center also benefits from a 1.2-kW solar photovoltaic system and a 10-kW wind turbine that together supply 20 percent of the Science Center’s electrical needs.

McKinstry recommended mounding the backfilled material over the new Ecoflex pipe to distribute surface water runoff and mitigate a problem that hampered the previously installed fiberglass pipe. The first winter after the installation, Wolf Ridge saved approximately $7,000 in fuel supply costs thanks to the changes suggested by McKinstry.

As an educational facility, Wolf Ridge uses these new energy-efficient resources to teach its students about the importance of district energy, renewable energy sources, and sustainability. It also demonstrates how solar and biomass energy sources can help increase energy efficiency.

“Everyone at Wolf Ridge is so passionate about the sciences and teaching others about the importance of energy efficiency and natural resources,” said Smerud. “I’m very proud of the work we do here, and I’m glad that our new energy systems will allow us to continue providing education in an energy-efficient environment for decades to come.”

For more information, visit www.uponor-usa.com. MCAA thanks Uponor for being an MCAA sponsor.

VICTAULIC

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producer of mechanical pipe joining solutions, made the decision to reach out for support an easy one. By joining forces, Current Mechanical would not only have access to Victaulic's experienced and knowledgeable VDC team, they also would benefit from the company's fabrication services. And by using grooved mechanical couplings, which are 10 times faster to install than welded joints, Current Mechanical could streamline installation with its limited workforce, which was an enormous benefit on a project that was understaffed from the outset.

"With the labor shortage, I am not sure we would have been able to complete this project without using Victaulic's fabrication services."

— Steve Lewis, Project Manager, Current Mechanical

Managing Last-Minute Changes

Victaulic's VDC team proved its value throughout the project, identifying potential issues, working rapidly to address them, and responding quickly to engineering design changes.

"One of the last steps before issuing fabrication spools is to issue preliminary drawings for review and signoff," said Brandon Horton, territory sales manager at Victaulic. On this project, "we received guidance from the mechanical engineer that required last-minute changes. Our VDC group was able to adapt and make the applicable adjustments needed."

Once the revised preliminary drawings were approved, Victaulic's VDC team began the fabrication process, which included spooling, fabrication maps, cutting lists, truck loading logs, and material procurement.

Sweetwater anticipated expanding its new warehouse, which would necessitate scaling up temperature and humidity control, so this project incorporated four large AHUs, all of which required triconnection coils. Problem-solvers at Victaulic addressed this requirement by using a series of single-coil AHU drops, which Current Mechanical was able to install in only four days.

"Making changes, especially during fabrication, can be a challenge, but it's incredibly important to make sure everything will meet layout and design intent," said Josh MacMurray, piping coordinator at Victaulic.

Pulling all the pieces together for seamless execution requires a true team effort. "It's quite a collaborative ecosystem," said MacMurray. "There are modelers on one end developing quantities, then they pass it on to customer care to allocate and prepare for production. We also work with the fabrication team to make sure the right quantities will be at the right place at the right time."

Victaulic provided on-site support and allocated all of the materials ahead of time, which was particularly valuable for the large-diameter pipe, which was not stored by the contractor and not available from local distributors. This approach meant materials could be released as needed for each phase of construction, and the necessary materials were onsite to permit construction to continue according to plan.

Innovative Solutions

Because of the size of the warehouse and its eventual expansion plans that would necessitate scaling up temperature and humidity control, this project incorporated four large AHUs, all of which required triconnection coils. Problem-solvers at Victaulic addressed this requirement by using a series of single-coil AHU drops. "This was an example that really showed the flexibility of our product lines," said MacMurray.

As critical as this solution was, of equal significance was the product's ease of installation. Although the contractor feared the workaround would be labor- and time-intensive, because of the simple design of the Victaulic catalog item, workers were able to complete the AHU drops in only four days.

Another "first" on this project was the installation of Victaulic's QuickVic™ SD Installation-Ready™ System for small-diameter pipe. Used on the compressed air system that moves the conveyors that transport instruments through the warehouse, these products featured a thermally diffused zinc coating for improved corrosion resistance.

Additionally, Victaulic's globe-style balancing valve was a key advantage for this project. Globe-style valves are preferred over ball-style valves because they provide much more accurate flow control of the heating and chilled water through the AHUs, humidifiers, and dehumidifiers.

The Grand Finale

Working together, Current Mechanical and Victaulic were able to successfully deliver the project on schedule. Even more important, the groundwork has been laid for Sweetwater to continue to grow for future encore performances.

For more information, visit www.victaulic.com. MCAA thanks Victaulic for being an MCAA sponsor.

SLOAN

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fixtures from 3.5 gallons per flush (gpf) to 1.28 gpf, the demand on a water supply system would be reduced. However, the opposite is true: The same amount of waste must be evacuated through a new fixture with half the water volume—in many instances, a smaller water spot and trapway.

Plumbing layout and number of fixtures being fed by each line—Is the building plumbed correctly with main lines? Are all branch lines sized correctly to meet the demands of the fixture counts?

Past history of building expansion—Have there been additions to the building's footprint without increasing the water supply system capacity?

Water quality—Water quality is an often overlooked factor in water savings analysis. In piston valves, high amounts of sediment or sand shorten the life by wearing down the lip seal. This results in a shorter flush cycle, making it necessary to flush twice to clear the bowl. Diaphragms with unprotected bypass holes may experience run-ons if the sediment clogs the bypass, or they may develop much greater flush volumes if the bypass is partially blocked.

Fixtures and Valves

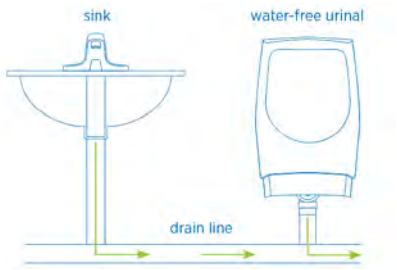
Document the manufacturer and model number of all the equipment to be replaced and assess the age and condition of the equipment. Gather the following information:

- Flush volume rating
- Any signs of leaking from fitting or fixture
- Last maintenance or maintenance schedule

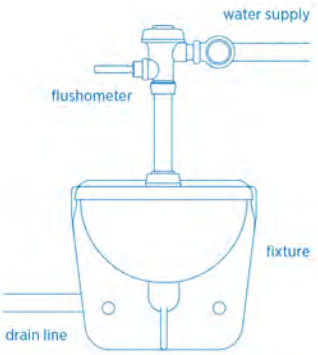
Downstream

Depending on the age of the system, the original waste line carry calculations were probably based on 4.5 gpf. Through attrition, the original fixtures may have been replaced to 3.5 gpf or 1.6 gpf. Further reducing the water to 1.28 gpf could result in downstream problems. Here are some red flags:

- Problem or chronic line blockages or toilet backups
- Poor pipe conditions, including corrosion, leaks, and cracks
- Long horizontal waste line runs
- Improper waste line slope
- Signs posted in restrooms warning what not to flush down fixtures



With no water following the liquid waste, drain lines are subject to the buildup of struvite.



Previously, water closets used up to five gallons in 90 seconds to flush and transport waste down the waste line. Now, 1.6 gallons is used in 20 seconds.

Step 2: Determine the Feasible Options

Once the assessment is complete, a more accurate picture of the available (and practical) options for the retrofit can be determined. Depending on the number of red flags raised, the scope of the project may need to be adjusted, taking into account the expected cost and anticipated water savings for each option. Possible upgrade options include the following:

- Minor upgrade: Change out diaphragm kits.
- Intermediate upgrade: Change out flushometers.
- Moderate upgrade: Change out flushometers and fixtures.
- Major upgrade: Change out the entire plumbing system.

Step 3: Prepare the Estimate

With the assessment complete, the most appropriate option can be selected and quoted to the customer. Then, it is time to start procuring materials.

Step 4: Test the Solution

Testing the planned savings strategy on one or two fixtures or restrooms before converting the entire building can provide valuable insights into the expected performance of the system. Be sure to test the most extreme cases first (i.e., fixtures farthest from the water supply or situations with the greatest demand).

Step 5: Expand the Upgrade to the Entire Building

If the test installation performs as expected, go forward with the project.

Commercial water savings projects are not only financially smart, they are environmentally responsible—and in some municipalities, legally mandated. Today's technology can help achieve real and meaningful savings, but the reduced water volume can have unintended consequences if the plumbing system is not capable of adapting to the lower flow. With foresight and planning, risks can be avoided and water savings goals achieved.

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FARO

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means a dedicated push toward upping their efficiency gains while reducing their per-project spend—all without loss of accuracy or quality control. Recently the publicly traded company, which specializes in integrated building systems with expertise in the design, installation, management, service, and maintenance of HVAC, mechanical, electrical, plumbing, and control systems, sought to improve its MEP workflows by incorporating 3D laser scanning and reality capture solutions into its business model.

Increasingly, profiting from the "new normal" means selecting talented team members from all over the country, Lamberson explained. In a post-COVID economy in which companies seek to minimize the number of staff onsite for a project and also reduce their liability in case an employee falls ill or is injured on the job, the best-suited engineer might be in Ohio for one project and Florida in another. It is that type of staffing deployment precision that 3D laser scanning and reality capture technology help enable. "So the scanner is grabbing every detail, and I can share that file with all 10 branches of the company so that we can leverage the best people for the job," Lamberson noted.

Thanks to the highly granular detail FARO's Focus scanners capture (collecting millions of data points for point cloud generation in only a few minutes per scan), not only can Limbach document a given facility, they can provide a variety of additional customer services, including the following:

- Logistics planning for newly selected equipment
- Supplemental engineering documents on how best to connect the equipment to building services
- The ability to return to the site to take subsequent scans, transforming a single scan of an as-built environment into a "living document," updated to match any changes made
- Site validation for off-site prefabrication to mitigate risk when fabricating assemblies for older facilities and enhancing the effects of industrialized construction

Automation Appeal

While naysayers might conclude that some of the post-COVID, technology-enabled health and safety improvements will wane in importance as the months progress, Lamberson is more optimistic. The new efficiencies and targeted deployment of personnel will persist. Time savings and money savings are not pandemic-specific. And as the world has noted, COVID safety protocols have radically reduced the incidence of other illnesses and absences.

For these reasons, the new normal is here to stay. So if one employee onsite can do what three could do previously, it stands to reason that automation's potential will increase. This is where the future lies—autonomous and semi-autonomous reality capture where a drone, operated remotely hundreds or perhaps thousands of miles away, can perform the same tasks a single human can onsite today. It is a future Lamberson and Limbach Holdings Inc. are eager to embrace.

For more information, visit www.faro.com.

IMI Hydronic Engineering Describes Keys to Perfect Hydronic Climate Control

The ultimate goal of every heating and cooling installation is to provide the desired indoor climate at the lowest possible energy cost. Today's advanced control technology means that, in theory, achieving this goal is possible. In practice, however, even the most sophisticated controllers do not always perform as promised. The result is lower-than-desired comfort level and high energy expenditure. The controllers can only perform their functions as specified if the three key conditions for hydronic control are fulfilled:

1. The design flow must be available at all terminals.
2. The differential pressure across control valves must not vary too much.
3. Flows must be compatible at system interfaces.

The best way to attain these three conditions is to perform a balancing procedure to ensure that the plant performs and operates as specified by the designer. Balancing can help find and remove issues ranging from incorrectly implemented balancing calculations to assembly errors, such as incorrectly installed check valves, and blocked filters. The balancing procedure allows you to immediately reveal the effects of any disturbances, identify the cause, and take corrective measures. This article summarizes IMI TA's expertise in the three key hydronic conditions, describes how to identify when the conditions are not being met, what caused the problem, and how to solve it.

Condition 1

To ensure that the design flow is available at all terminals, hydronic balancing is necessary. Hydronic balancing prevents overflows in certain circuits from causing underflows in others. Balancing helps to detect possible oversizing of pumps and verifies that the plant provides the functions and performance as intended. See Table 1 for symptoms and solutions.

Condition 2

For stable and accurate control, the differential pressure across the control valves must not vary too much. Again, hydronic balancing is required to meet this condition. In fact, hydronic balancing is the only way to identify and resolve the real causes of operational problems in the plant. See Table 2 for symptoms and solutions.

Condition 3

For perfect hydronic control, flows must be compatible at system interfaces. To fulfil this condition, hydronic balancing is necessary so that the installed power in the plant can be delivered. The balancing procedure allows you to localize and resolve any hydronic problems. It also reveals possible oversizing of pumps and helps reduce pumping costs. See Table 3 for symptoms and solutions.

Other Benefits

Achieving the three key hydronic conditions can also bring the following benefits:

- Faster system balancing and commissioning using the right balancing products and following proper engineering methods
- Quicker return on investment and lower risk for owners with a well-optimized system, detailed commissioning reports, and happy tenants
- Added flexibility for any system changes and future expansion (with no rebalance needed) for the designers and contractors

For more information, visit www.imi-hydronic.com, call 855-55-ASK TA (855-552-7582), or email trainings.na@imi-hydronic.com.

Table 1: Design Flow Must Be Available at All Terminals

Symptoms (if condition is not fulfilled)	Common & Incorrect Countermeasures	Typical & Usually Neglected Root Causes	Correct Solutions	Advantages
- Too hot in some parts of the building and/or too cold in other parts	- Increase pump head - Increase or decrease supply temperature	- Overflow in some circuits creates underflow in others - Unbalanced circuits downstream of Δp controller	- Balance distribution system	- Power installed installed deliverable - Correct room temperatures at optimized energy cost - Shortest possible start-up time - Identification of hydronic problems at an early stage - Documented & verified flows - Possibility of minimizing pump energy - Possibility of measuring & logging the flow for troubleshooting
- Delayed start-up and setback	- Cancel the setback function or start-up earlier	- Overflow in some circuits creates underflow in others - Unbalanced circuits downstream of Δp controller	- Balance distribution system - Balance circuits downstream of Δp controller	
- Abnormal pump energy consumption	- Change or adjust pump	- Oversizing of pump	- Balance plant & adjust and optimize pump	

Table 2: Differntial Pressure Across the Control Valves Must Not Vary Too Much

Symptoms (if condition is not fulfilled)	Common & Incorrect Countermeasures	Typical & Usually Neglected Root Causes	Correct Solutions	Advantages
- Supply air or room temperature fluctuates - Hunting control valves	- Modify control software - Replace correctly sized but hunting control vales with smaller ones	- Unbalanced plant - Low control valve authority - High differential pressure variation	- Balance plant - Stabilize differential pressure by using Δp controllers	- Stable and accurate temperature control - Low energy cost - No noise problems - Identification of hydronic problems at an early stage - Verified and documented flows - Possibility of measuring and logging the flow for troubleshooting
- Noisy control valves	- Replace control valves	- High differential pressure	- Limit differential pressure by using Δp controllers	

Table 3: Flows Must Be Compatible at System Interfaces

Symptoms (if condition is not fulfilled)	Common & Incorrect Countermeasures	Typical & Usually Neglected Root Causes	Correct Solutions	Advantages
- Maximum installed power is not deliverable	- Increase secondary pump head - Install more production units - Increase or decrease supply temperature	- Secondary maximum flow not compatible with primary maximum flow	- Balance the plant and ensure flow compatibility	- Installed power is deliverable - Correct room temperatures at optimized energy cost - Identification of hydronic problems at an early stage - Verified and documented flows - Possibility of measuring and logging the flow for troubleshooting - Short start-up time
- Delayed start-up and setback	- Cancel the setback function	- Secondary maximum flow not compatible with primary maximum flow	- Balance the plant and ensure flow compatibility	

Procore Software Boosts Monterey Mechanical's Productivity, Saving One Day Per Employee Per Week

By installing Procore software, Monterey Mechanical Co. was finally able to offer mobile information access to everyone on its team. The efficiencies gained work out to a savings of one day a week of work per employee. Monterey Mechanical credits Procore with helping them complete projects early, as in the case of a Brentwood, CA, water treatment plant, and under budget, as with a San Francisco wastewater treatment facility.

Monterey Mechanical had a software solution to manage projects, but it did not offer mobile functionality in the field. "Only the project manager or project engineer had access to the information. The field people didn't have access," recalled Division Manager Ed Moore. Moore also noted that the system often crashed. Plus, employees stored documents on their own devices which made collaboration difficult. Moore further explained, "Project managers used their own forms and systems. It was really disjointed. Everybody had their own stuff and it wasn't shared."

A construction manager that Monterey Mechanical worked with recommended Procore, and they implemented it soon after. Procore offered a centralized platform that was accessible to all collaborators—from anywhere. All the project information is now consolidated into one platform. "Procore gave our field team access to information," said Moore. "Everything that used to be in a file cabinet is now accessible with a couple of clicks."

Not only did field teams have access to important project information, so too did executives, accounting teams, and other project stakeholders—all in one place. They could easily view, update, and share information, regardless of their location. "The president of our company can get access to information, and so can a foreman out in the field. They can both see submittals, RFIs [requests for information], and document photos," said Moore.

More importantly, the system was easy for teams to adopt. "The field teams aren't really used to technology, so we were worried they might struggle with it—but that wasn't the case at all. When we made it available to them, they latched onto it and ran with it," Moore noted. That ease of use helps Monterey Mechanical attract and retain top talent.

"We're a 77-year-old company, but we like to think we're on the leading edge of what's going on. When people hear that we're using Procore and we're doing different things with construction technology, they get excited about possibly coming to work for us," said Moore. "Procore offers their platform to schools, so students are using it now too. It's great for when we're recruiting and they hear we use it," he added.

Moore said that with a centralized system, Monterey Mechanical is able to maintain consistent processes. "It's exciting to see how our new talented employees are developing and how Procore helps us with that. With Procore, it's easy to show them what our standard procedures are."

In doing so, Monterey Mechanical not only ensures its success now but also sets itself up to continue its longstanding legacy into the future. "I enjoy seeing these new talented people stepping into important roles in our company," said Moore. "I can see us being able to turn the reins over to them, hopefully, in the future."

For more information, visit www.procore.com.

Top: Monterey Mechanical used Procore to manage its work on the Brentwood, CA, Water Treatment Plant, completing the project four months early—with no change in scope or budget.
Bottom: Procore helped Monterey Mechanical keep the San Francisco Public Utility Commission's Southeast Treatment Plant project on schedule and $2.25 million under the city's revised budget—after tasks were added to the original scope of work.

Bayer's Plumbing Finds Perfect Fit with Easy-to-Install MIFAB HDPE Interceptors

When Bayer's Plumbing of Newburgh, IN, needed a modern grease interceptor solution for a local deli, they turned to MIFAB for a product that cost less and was much easier to install than traditional riser systems, according to Matt Pry, project manager. Because local regulators had been approving poly hydromechanical tanks, Bayer's Plumbing proposed a MIFAB high density polyethylene (HDPE) interceptor for the long-time local dining staple EMGE Deli in Evansville, IN, winning the job.

Pry said that the MIFAB BIG-MAX 750 (75-gpm HPDE hydromechanical interceptor) product was the perfect fit. "It is a good product, well-built, with a better-than-competitive price point. The generic corrugated riser pipe really is what put it head-and-shoulders above its competitors in this space."

Making the Move to HDPE

When MIFAB opened its doors in 1982, they had two products: access doors and interceptors. Today, interceptors are still a major part of the more than 14-division MIFAB brand. In 2010, MIFAB began getting requests for HDPE interceptors. After some research, MIFAB saw that HDPE made up a very small but rapidly growing share of the market, so they made the leap to HDPE. Today, MIFAB has the largest selection of plastic grease and specialty interceptors in the U.S. plumbing market. The fast growth of the market can be attributed to contractor demands for products that are easier to install and foresight by local jurisdictions seeking to protect the environment and their sewer systems.

With concrete and steel interceptors, it is not a question of if these units will fail but when. Steel units have an average life expectancy of seven years, and concrete units have an average life expectancy of 12 years because of the corrosive effects of the acid in the waste. MIFAB's HDPE grease interceptors have a lifetime warranty, and they ensure that the waste will not be going into the ground or passing into sewer systems, where it can have a very detrimental effect.

Speedy Separation

The key to a grease interceptor functioning properly is separation speed and capacity. Gravity-fed interceptors use time-based separation, and it takes a lot of time for the grease to separate and float to the top of the tank. Hydromechanical units are flow-based, which means they use a flow control device at the inlet to slow the grease-laden material down so that it separates very quickly upon entering the tank.

Gravity-fed tanks must be pumped out when they are only a quarter full. After that point, the unit will start passing grease into the sewer system—a huge problem that can result in large fines for the owner. With hydromechanical systems, the unit can almost be full and still have excellent separation. Effectively, a smaller hydromechanical unit has more capacity than a gravity unit. As a result, the designer and the contractor do not need more space to install the larger tanks.

Bayer's Plumbing chose MIFAB's cut-to-fit risers for a client's grease interceptors because they make installation cost-effective and simple.

Easier Installation

Steel units can be difficult to handle and can easily cause cuts to the hands. Inevitably, the seal on the interceptor will fail, which allows waste and odors to escape into the kitchen, resulting in a call back to the installing contractor.

Concrete tanks pose even bigger coordination issues. The contractor may need to rent a crane or schedule—down to the hour—when the boom truck will arrive. If the hole for the tank is not properly prepared, the truck will leave but still charge for the time. A typical 1,500-gallon concrete unit can weigh up to 15,000 pounds. On the other hand, a 1,500-gallon HDPE unit will only weigh around 1,500 pounds. These plastic units can be stored above ground on the jobsite and moved around easy with a fork truck or forklift.

Finally, manhole risers have always been an issue, because the contractor will generally not know the finished grade until the end of the project. At that point, the contractor must order custom-height risers that are expensive and require a long lead time to produce. MIFAB has a patented riser system that uses generic corrugated plastic pipe that can be cut to fit. The pipe is inexpensive and readily accessible from your local plumbing wholesaler.

For more information, visit www.mifab.com.

Using MSUITE and Prefabrication, Limbach Completes Hospital Project Two Months Ahead of Schedule

With MSUITE's FabPro software, Limbach successfully streamlined operations in a pop-up fabrication shop with multiple trades working side-by-side, minimizing assembly and installation time. The combination of exceptional teamwork, technology, and advanced planning led to completion of the project two months early and helped the building owner save $5.6 million.

Headquartered in Pittsburgh, PA, Limbach has 1,500 employees nationwide and 10 major branches across the United States. As a leading MEP contractor, Limbach leverages MSUITE to offer integrated building systems solutions with expertise in design, fabrication, installation, management, service, and maintenance of HVAC, mechanical, electrical, plumbing, and control systems. The firm includes an in-house MEP+C design-build staff and eight fabrication shops with a total fabrication capacity of about 208,000 square feet.

Facilitating Fabrication

Although Limbach already uses MSUITE at its fabrication facilities, multitrade usage was a new opportunity. MSUITE's FabPro software helps manage productivity for fabrication shops. The cloud-based platform offers production tracking and reporting and documents everything from start to installation for multiple trades.

Once the project team decided to set up a multitrade fabrication shop for the McLaren Greater Lansing Hospital project, the team acquired the Pine Tree Shop, a 25,000-square-foot warehouse, to convert into the fabrication facility they needed. It was a huge advantage that allowed Limbach to quickly manufacture and transport materials to the jobsite, which was only two miles away. MSUITE's expertise in fabrication helped Limbach come up with the fabrication shop layout for optimal flow. Limbach used MSUITE's BIMPro and FabPro to take model information to the shop floor and track real-time status and productivity.

With MSUITE's FabPro software, Limbach successfully streamlined operations in a pop-up fabrication shop with multiple trades, minimizing assembly and installation time. Prefabricating units like this one ultimately cut the project time line by two months.

Limbach's team set up 220 total racks and six assembly lines to add 4,400 linear feet of racks with a total of 71,500 linear feet of conduit, piping, plumbing, sheet metal, cable tray, and drywall. All of these were tested, inspected, and insulated in place. The total assembly time in the shop for Limbach's scope of work was 8,000 hours for a four-day turnaround per line. The entire process per floor was approximately a three-week turnaround, which included the shop assembly line, delivery, installation, and finalization. The environmental control and ability to streamline the work increased productivity and quality.

From the beginning, the joint venture Barton Malow-Christman and its stakeholders were on board with Limbach delivering the mechanical, electrical, plumbing, and fire protection aspects of the project. The group (which included the owner, engineer, general contractor, and subcontractors) invested heavily in design-for-manufacturing (DfMA) principles to engineer the building for prefabrication.

Connecting Design, Fabrication, and Field

MSUITE's management software includes design automation capabilities in Autodesk Revit with seamless integration to fabrication tracking software in FabPro and field tracking software in the field. The entire methodology allows continuous feedback into the process for improvement to facilitate better communication, collaboration, and workflow efficiency.

Mark Lamberson, CPD, Limbach's national virtual design and construction (VDC) manager, said, "MSUITE's workflows helped Limbach track production and provided to the owner real-time reporting of fab shop inventory, including documentation to support monthly billings." The data captured also provides easy access to the detailed tracking information required by insurers.

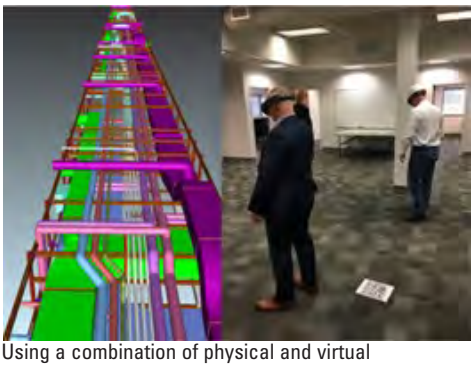
The DfMA process helped the team visualize racks and corridors to reassure the owner that the strategy would meet the building's lifecycle needs and aggressive schedule. Using "mixed reality," a combination of physical and virtual information, the owner's representatives were able to explore the racked systems to simulate the ease of installation and future maintenance. Mixed reality was also used for quality assurance and quality control of modules and allowed the owner to "walk through" virtual racks alongside the fabricated racks.

The DfMA approach incorporated Lean manufacturing concepts such as identifying high-value fabrication targets—for example, headwalls, wet walls, and bathroom pods. The team employed the "choosing by advantages" technique to select the right modules for the project. Key decision-making factors included the availability and costs of shop space, jobsite congestion, material handling, and delivery.

Collaboration Saves Time, Labor

The McLaren Greater Lansing Hospital project benefited from considerable collaboration across all trade partners on the jobsite. The shop workforce included just 14 people for all trades, resulting in a 30-percent reduction in trade labor onsite for installation of the racked systems. Installing the racked systems in the building took about an hour per rack, totaling 220 hours.

The assembly on the jobsite was extraordinarily efficient compared with stick-building, and eliminating the extra time onsite produced significant savings. MSUITE helped onsite and fabrication teams alike track the real-time status and productivity metrics.



Using a combination of physical and virtual information that incorporated BIM modeling from MSUITE helped Limbach target the best candidates for prefabrication, improving communication and collaboration among designers and fabricators.

Lamberson noted, "The two-months schedule savings resulted in a $5.6 million-dollar direct return to the owner. Two months of unexpected operational time for the health care facility can mean an indirect revenue impact of $60 million."

The prefabrication approach yielded other benefits for the project team. Workers were able to test, insulate, and tag all the products in the fabrication shop before delivering them onsite. Having products ready to install as soon as they were delivered helped mitigate the effects of the harsh Michigan winter onsite. The risk of exposure to COVID-19 infection was decreased because fewer workers had to be on the jobsite and those in the prefabrication shop were separated into workstations.

Limbach offered the following lessons learned from the McLaren Greater Lansing Hospital Project:

- **Early involvement:** Early team involvement is critical to success.
- **Building the team:** All stakeholders must be present (carpenters, etc.).
- **Fabrication support:** Prefabrication must be supported from the top down.
- **Mindset shift:** The team must adopt the attitude of "What *can't* we fabricate?"
- **Fabrication shop proximity to jobsite:** Consider over-the-road requirements, permits, etc.
- **Team decisions:** Use the entire team for decisions; different stakeholders will perceive different benefits and drawbacks.

See the online version of this article at MCAA.org for a video and list of project participants.

For more information, visit www.msuite.com.

Atomatic Handles Increased Workload With XOi App

Atomatic Mechanical Services Inc. credits XOi with helping them manage their workload. "Before using XOi, we were on the brink of having to hire more inside support to handle quotes," said Jordan Goldenstein, general manager of Atomatic's residential group. "Now, with this smoother process, we are able to handle the work with our existing personnel."

Atomatic was founded in 1945 to install, service, and design HVAC systems for the residential new construction marketplace. The company has grown and continues to serve commercial, institutional, industrial, and residential buildings and homes throughout the Greater Chicago area.

The XOi Vision app has set Atomatic apart from its competition by allowing their techs to provide thorough information to both clients and team members through the use of photos and videos. By implementing XOi, Atomatic has seamlessly enhanced job summaries and information with more detail, reduced workflow errors, and streamlined internal processes. The app enables them to give visual information that justifies all of their recommended and completed work.

With the XOi Vision app, Atomatic can take photos and videos that justify the recommendations and completed work, streamlining the process for estimates.

"We can now utilize existing completed workflows as marketing pieces for potential clients," said Goldenstein. "Not many contractors in our area are using technology like this, so it has added great value for us. The streamlined process for our quoting is allowing us to be more efficient internally and provide a better product to our clients."

For more information, visit www.xoi.io.

Dezincification: Breaking the 15-Percent Zinc Wall

Wieland Chase Explains Processes Leading to Improved Dezincification-Resistance

By Larry Muller, Senior Technical Advisor, Wieland Chase, LLC

Some technical papers and websites on brass corrosion repeat the same caution that dezincification will occur in alloys containing more than 15-percent zinc. A few will go beyond that simple statement to talk about efforts to solve this issue. The 15-percent zinc limit is generally the only thing that stays in the readers' mind if they are trying to design a part that is in an environment that could lead to dezincification.

Reading this was a surprise to me after spending 28-plus years as a metallurgist working with a variety of copper and brass alloys. After all, our industry had sold billions of pounds of C36000, a 35+-percent zinc-leaded brass, to the potable water industry without corrosion problems outside of installation or grounding issues. If 15-percent zinc was the dividing line between a suitable brass for corrosion resistance and one prone to failure, where were the complaints, and why did the plumbing industry continue to use it?

The reason behind this 15-percent zinc content concern is lost to history. Older technical papers don't provide a trail to the problems that caused someone to establish 15-percent zinc as an upper limit. It just gets repeated in formal and informal articles and papers on corrosion of brass without any attribution or investigation. The problem is that "15-percent zinc" isn't the full story.

The history of brass used in water applications for the last 100 years shows that brass alloys with up to and over 35-percent zinc have been used successfully to the tune of multiple billions of parts in the United States and Europe. It didn't happen without some effort, but it did happen, as the following examples show:

1. The problem of dezincification in 70-percent copper/30-percent zinc brass tubes in steam-powered navy ship condensers was solved through an addition of an alloying element corrosion inhibitor (1).

2. The problem of severe dezincification in potable water fittings was solved in Europe in 1980 with the introduction of a brass (CZ132/CW602N) using a high temperature anneal and addition of an alloying element corrosion inhibitor to leaded brass containing 36 percent zinc (2).

3. In the United States, alloys C36000 and C37700 with about 36 percent and 39 percent zinc, respectively, were used successfully for decades without significant issues with dezincification.

4. New lead-free brasses have been developed and commercialized with zinc contents greater than 15 percent, some using the single or double approach of alloying element and thermal processing to be dezincification-resistant.

Development of Dezincification-Resistant Brasses With Greater Than 15-Percent Zinc

It's obvious then that brasses with zinc greater than 15 percent show no dezincification problems when using the metallurgical advancements of the last 100 years. The following provides explanations and data on what tools are used to make those brass alloys dezincification-resistant, what is meant by dezincification-resistant, and the tests that indicate they will provide long, functional lives.

What Does Dezincification-Resistant Mean and How Is It Tested?

The old 15-percent zinc claim that brass "suffers dezincification" is vague. A brass part with zinc levels below 15 percent can show small levels of dezincification according to some published studies, and those with up to 35 percent can show no dezincification. Because the problem can affect alloys with up to 15-percent zinc, obviously some dezincification was considered acceptable. Recently, the brass world changed with the requirement to eliminate the use of leaded brass in potable water fittings (3, 4) and some high-profile PEX fitting dezincification failures in the Las Vegas area (5, 6). It became necessary to: 1) develop new lead-free alloys; 2) to define what "dezincification-resistant" meant quantitatively (7–11); and 3) have tests that would provide guidance on how long a part can be expected to last.

According to the various standards referenced in Table 1, a brass is considered dezincification resistant if it meets the requirements of the standards shown. There are other tests (Turner, Brandl) but the ISO6509 test has been the international standard since 1981. Independent studies (12–14) have shown this test successfully predicts long-term (greater than 30 years in corrosive drinking water) performance. An important point here is that this laboratory test uses extremely harsh conditions to accelerate the potential for corrosion that will take years or decades to develop.

What Metallurgical Tools Are Used to Make Alloys Meet the "Dezincification-Resistant" Requirements?

There are three primary tools that

make brass dezincification-resistant according to current requirements.

Minor alloying additions (0.20 percent maximum): Arsenic (As), Antimony (Sb), Phosphorus (P). These are the alloying element additions that have been researched and put into production over the last 100 years. There's enough laboratory and real-life performance data to show that they are effective in preventing dezincification in brasses with zinc contents up to 36 percent (Figure 1). Above 36-percent zinc, neither these nor the major alloying elements shown can fully protect the brass because of a zinc-rich phase (beta phase) that forms during processing.

Major alloying additions (>0.25 percent): Nickel (Ni), Tin (Sn), Aluminum (Al). These alloying element additions have been in use longer than the minor alloying additions mentioned above. They are just as effective as the minor additions but have the same limitations of not being able to protect brasses with greater than 36-percent zinc because of the beta phase vulnerability to dezincification.

Thermal treatments such as high temperature annealing or forging. This method reduces or eliminates the beta phase in higher zinc brasses. By converting beta phase to alpha phase, it can now be protected by the minor or major alloying additions. The precaution here is that the cooling rate after these thermal treatments has to be slow enough to prevent beta phase from reforming. Fortunately, that process is well understood by the brass mills performing the operation.

What Data Show How These Metallurgical Techniques Improve Dezincification Resistance?

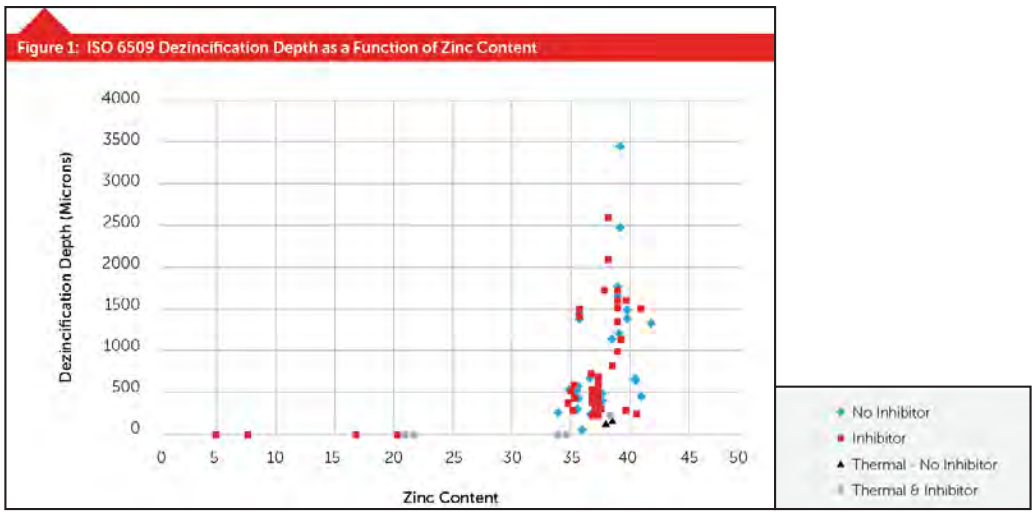
Figures 1, 2, and 3 show ISO6509 test results from an independent laboratory. Figure 1 shows the range of results from having no special metallurgical protection to alloying plus thermal treatments on alloys from 5-percent zinc to 42-percent zinc. At some point above 36-percent zinc, beta phase begins to form increasing amounts, so nothing can protect it as discussed above (Note: All test results are from Corrosion Testing Laboratories, Newark DE).

Table 1: Dezincification Resistance Tests and Pass/Fail Criteria

	ISO 6509 (1, 2 & 3)	AS2345	UL199	EN12164
Application	General	General	Sprinklers	Rod
Test Solution	1% CuCl2	1% CuCl2	1% CuCl2	1% CuCl2
Test Temperature	75° C	75° C	75° C	75° C
Test Length	24 Hr.	24 Hr.	144 Hr.	24 Hr.
Max. Dezinc. Depth	See notes 2 & 3	-	200µ	100µ
Avg. Dezinc. Depth		L:300µ; T:100µ	-	-

(1) Initially developed to correlate with Swedish, Australian and South African field tests.
(2) Example of user defined pass/fail critera: NSF 14 limit is 200µ
(3) ISO6509-2 was approved on 3/6/2017 for the following limits:
  a) forgings & castings avg. 100µ, max. 200µ;
  b) extruded rod longitudinal avg. 300µ, max 400µ and transverse avg. 100µ, and 200µ.

Figure 1: ISO 6509 Dezincification Depth as a Function of Zinc Content



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WIELAND CHASE

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In Figure 2, you can see that the use of the two methods of the minor alloying addition and thermal treatment combine to improve dezincification resistance. However, they can only do so much before the beta phase problem negates their beneficial effects.

Figure 3 shows ISO6509 results for alloys with or without phosphorus and no thermal heat treatments. Except for the 21-percent zinc alloy, there's a large fluctuation in results until the phosphorus addition is made.

Improving Dezincification-Resistance

The data and information above show:

- the use of dezincification resistance alloying elements are an effective way to significantly improve dezincification resistance in brass with greater than 15-percent zinc;
- publications provide evidence that theses metallurgical technologies have been in use in production brass alloys for up to 100 years;
- any shortcomings of metallurgically advanced brasses with greater than 15-percent zinc would have been revealed by now; and
- this metallurgical technology has been replicated successfully among a number of "new" brasses commercialized to meet the 2014 national low lead requirement.

References

Find a list of the references used in the preparation of this article in the online version of the story at MCAA.org.

Figure 2: ISO 6509 Dezincification Depth (Maximum)

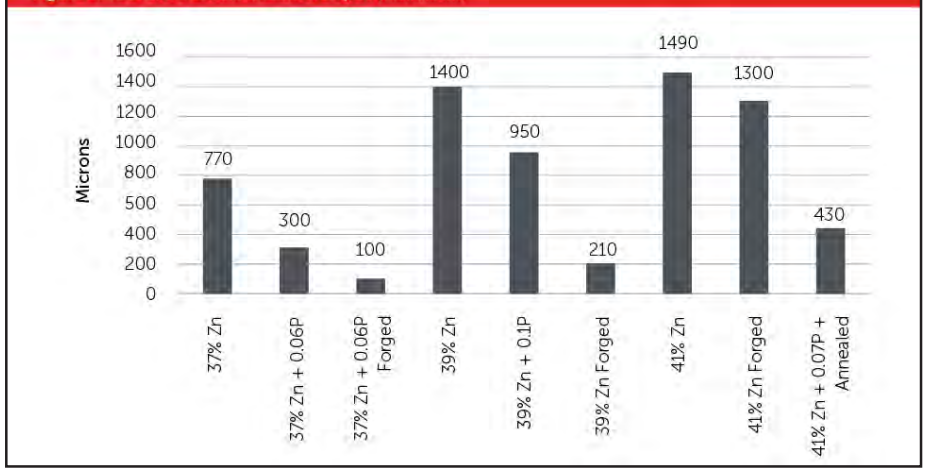
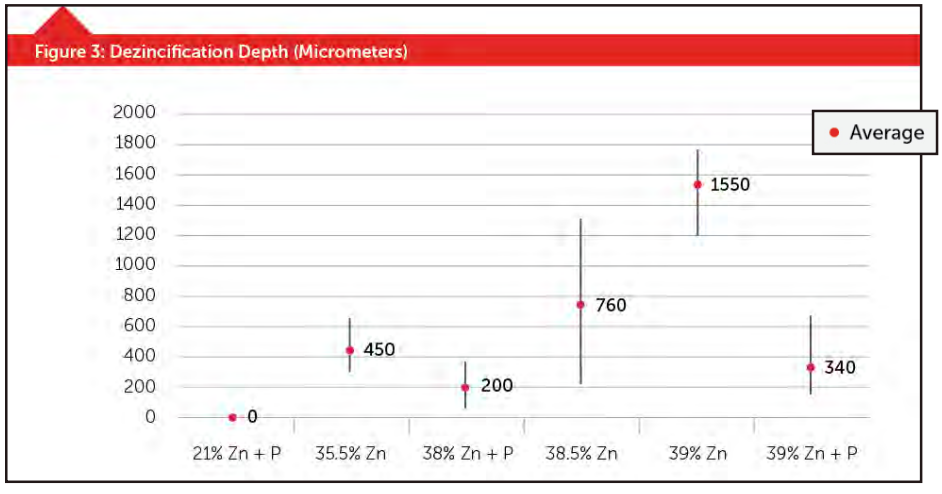


Figure 3: Dezincification Depth (Micrometers)



Marking Services Inc. Makes Hospital's Documents Easily Accessible, Saving Money and Ensuring Regulatory Compliance

AIM Mobile Technology and Field Implementation Services from Marking Services Inc. (MSI) allow Boston Children's Hospital (BCH) to keep track of documents for thousands of facility assets—which not only helps them comply with rigorous requirements for health care institutions but also saved money by ensuring easy access to warranty information for a failing piece of equipment. The move from paper to digital helps the hospital provide care that aligns with best practices.

"MSI's AIM Mobile Technology and Field Services provided the necessary tools for our operation's team to consistently maintain and operate equipment in the most efficient and effective manner."

—Paul Williams, Director of Engineering, Boston Children's Hospital

The BCH maintenance and engineering teams recognized that their paper tracking system was not efficient. It was also difficult to use during audits by The Joint Commission, which subjects hospitals to regular reviews to maintain their accreditation. With limited resources to ensure that critical documents were available on demand and that all assets were identified and inventoried on an ongoing basis, BCH turned to MSI.

MSI partnered with BCH to implement AIM Mobile Technology and Field Implementation Services to label all facility assets accurately with a scannable QR-coded tag. Once tagged, assets can be scanned with a mobile device, providing users with critical asset documents instantly on location in the field. This service is proving invaluable to BCH, as they can pull up maintenance records, manuals, warranty information, drawings, work orders, inspection reports, and more simply by scanning the equipment tag. Not only does this service improve operational efficiency, it also adds confidence that the system is compliant in the event of an audit.

BCH is especially satisfied with how AIM Services helps them serve their patients. BCH Director of Engineering Paul Williams said, "The most important element of our operations is the regulatory requirements BCH must follow, which focus on industry best practices and safe operations for our patients, which directly impact our patients' care. MSI's AIM Mobile Technology and Field Services provided the necessary tools for our operation's team to consistently maintain and operate equipment in the most efficient and effective manner."

For the project, MSI did a complete field survey to locate, identify, and tag all assets. The AIM Services team then mined data from the proper documents and uploaded the documents to the cloud-based information management application, which can be accessed 24/7 from a mobile device or desktop computer.

AIM Services provides BCH with confidence that all its asset documents are stored correctly, both during construction and after commissioning in daily operations. Everyone, from facility managers to contractors, now has a secure portal to access information that will save time and money and ensure that BCH is operating at peak efficiency to provide the best care possible for patients.

For more information, visit www.markserv.com.

With all facility assets tagged by MSI with a QR code that links to complete documentation, accessible from anywhere, Boston Children's Hospital can access maintenance records, manuals, warranty information, inspection reports, and more simply by scanning the equipment tag, streamlining operations and improving efficiency.

Lochinvar and EMCOR Services-Betlem Partner to Provide Energy Efficiency

Cogeneration System Meets Ambitious Sustainability Goals

Lochinvar boilers installed more than 25 years ago on Finger Lakes Community College's (FLCC's) main campus delivered state-of-the-art high efficiency in their day, but the college needed to upgrade to meet its ambitious energy-reduction goals. EMCOR Services-Betlem recommended Lochinvar's XRGI®25 combined heat and power system, integrated with a new KNIGHT® boiler system, to provide hot water and space heating across nearly 500,000 square feet of campus buildings—resulting in a cogeneration system that creates energy as it works.

FLCC has served upstate New York for more than 50 years. Annual enrollment is about 6,000, and most students attend classes at the 250-acre main campus in Canandaigua, NY. FLCC Forward, the school's strategic plan through 2023, emphasizes FLCC's commitment to "pursue innovations and partnerships that show the greatest promise for building a culture of sustainability and continuous improvement that mirror our values of inquiry, perseverance, and interconnectedness."

Catherine Ahern, FLCC's director of facilities and grounds, met with Bill Coe, director of project development for EMCOR Services-Betlem and Lochinvar sales representative WMS Sales to begin a New York State Energy Research and Development Authority study to identify capital projects to improve the college's energy efficiency. When the study was completed, Ahern and Coe began exploring options for replacing the domestic hot water system.

After a visit to Lochinvar, Ahern and Coe decided to integrate the company's Micro CHP XRGI25 cogeneration system into the capital project to increase savings further by connecting the school's domestic hot water system to its space-heating hot water loop. Adding the cogeneration system allows FLCC to generate electricity onsite. FLCC received a $17,000 design/build incentive from New York State Energy & Gas, the first incentive ever given for a cogeneration project in the utility's history.

Lochinvar integrated the XRGI25 combined heat and power system with a new KNIGHT boiler system to provide hot water and space heating for Finger Lakes Community College—resulting in a cogeneration system that creates energy as it works, reducing grid dependence and lowering electrical costs.

EMCOR Services-Betlem helped Finger Lakes Community College move its ambitious sustainability plans forward by specifying a Lochinvar cogeneration system for hot water and heating, earning the college a $17,000 design/build incentive from the state utility and projected electricity savings of more than $11,000 per year.

The college removed its two old boilers and replaced them with two Lochinvar KNIGHT 399,000 BTU/hr high-efficiency boilers and two hot-water storage tanks. The Micro CHP system was then piped in, prioritizing domestic hot water while also supplying space heating for nearly 500,000 square feet of campus buildings. The Micro CHP system uses natural gas to simultaneously create heat for hot water and electricity that can be used on the campus. This capability is particularly important in regions of the country where there is a wide "spark spread"—the difference between the low cost of natural gas and the high cost of local electricity. By relying on the high-efficiency KNIGHT boilers during periods of peak demand, the system provides all the hot water required at the school. Simultaneously, it generates electricity to reduce grid dependence and lower electrical costs by using the same fuel used to produce hot water. "The Micro CHP cogeneration project demonstrates FLCC's commitment to the sustainability and energy-saving goals that are central to our FLCC Forward strategy," said Ahern. "Adding the Micro CHP system along with the KNIGHT boilers will help FLCC achieve significant savings long term by improving the efficiency of both space heating and domestic hot water delivery while simultaneously generating electricity on campus," said Coe. EMCOR Services-Betlem estimated that the school will reduce its annual electric bill by $11,074 per year by generating electricity onsite with the Micro CHP system. Cogeneration projects typically have a return on investment payback time of four years—sometimes significantly sooner if the business is located in an area with a high spark spread.

"Adding the Micro CHP system along with the KNIGHT boilers will help FLCC achieve significant savings long term."

— Bill Coe, Director of Project Development, EMCOR Services-Betlem

The cogeneration system is the first commercial product released in Lochinvar's partnership with EC POWER, Europe's leading producer of combined heat and power plants. The partnership aims to meet the fast-growing need for cogeneration products that can reduce the environmental impact and electricity costs for commercial businesses across North America.

For more information, visit www.lochinvar.com/products/micro-chp/xrgi/.

Piping Systems Slashes Cutting Time and Increases Capacity With Watts-Mueller Machines

Piping Systems Inc. invested in a Watts-Mueller cutting system when it became clear that its current tools were too slow for jobs involving large-diameter pipe. Using the WM Classic Series WM-60 6-axis pipe profiler, a job that once took seven hours to cut was complete in less than an hour. "We knew the ability to reduce cutting times so much would give us a competitive advantage and the investment was necessary," said Piping Systems President Jeffrey Bunker.

An operator rides on the cutting carriage of the Watts-Mueller WM-60, a system that allows Piping Systems to complete a job that once took seven hours in less than an hour.

Need for Speed

Cutting large-diameter pipe can be cumbersome and time-consuming when done manually. After Piping Systems completed the largest project in its history—a 375,000-linear-foot project with diameters up to 72" and wall thicknesses up to 1.5"—the fabricator realized its current equipment conveyor system would not keep up in the long term. "The equipment's conveyor we had at the time was only rated for a maximum 500 pounds per foot. There was no way we could run heavy-wall, large-diameter pipe," said Tony Kent, vice president of Piping Systems.

Bunker added, "Our automated cutting process prior to the new equipment was limited to 42". Anything more than that was manual or machine-cut, and it was a slow process. After we completed that first large-diameter job, we knew we needed to be able to cut three to four times faster than what we were capable of doing."

Safety was also a concern, as large-diameter, thick-wall pipe is difficult to move by hand. To meet customer demand for heavy pipe processing, Piping Systems purchased a system from Watts-Mueller capable of managing 1,500 pounds per foot.

Previously, large-bore, heavy-wall pipe had to be brought in using forklifts, set up using the overhead crane or saw cut,

"We knew the ability to reduce cutting times so much would give us a competitive advantage."

—Jeffrey Bunker, President, Piping Systems Inc.

then moved to a machine beveling operation. "With the added capacity of the WM-60, most of the large-bore, heavy-wall pipe can be conveyed inside the facility, cut and beveled by the machine, and flowed directly into production," Bunker said. "There are very few touches by humans beyond that."

The system is 180' long and the largest setup Watts-Mueller has installed to date. It includes compatibility with drafting software, which allows Piping Systems to take cutting job files and import them directly to the machine to reduce manual input errors. "Our goal is to reduce input errors, and so the capability to export files from drafting software reduces overall error rates," Kent said.

Piping Systems' principal products include pipe spool fabrication (large bore and small bore), pipe racks, modular piping, and equipment skids. Founded in 1991, Piping Systems works with carbon steels, stainless steels, nickel alloys, low temperature and chrome alloys, and HDPE in four segregated bays within its Hortonville, WI, facility.

Customized Solutions

The WM-60 computer-controlled pipe cutting machine conveys and rotates pipe from 3" to 60" outer diameter with a 45' machine bed capable of supporting 1,500 pounds per foot to a maximum of 50,000 pounds. Located in Puyallup, WA, Watts-Mueller produces 3D profile cutting machines for round pipes, tanks, dished-ends, square and rectangular pipes, and steel beams, as well as automated welding solutions. The company has over 1,743 machines located in Germany, the United States, Russia, the United Arab Emirates, India, Singapore, and Brazil. Large projects require Watts-Mueller to visit a customer's

Watts-Mueller's WM-60 uses 180 ft. of conveyors to transport pipe from the outside into the main fabrication shop, which enables Piping Systems to cut and bevel most large-bore, heavy-wall pipe inside the facility so it can go directly into production.

location to discuss requirements. "We need to see where the machine will ultimately be installed in their shop," explained David Carr, managing director of sales and marketing. "We complete drawings based off those measurements and design a machine that is then submitted to the customer for approval."

Watts-Mueller is capable of building 160"-diameter machines. Training time varies. "Generally, the install is two weeks for a system this large, and operator training takes one week," Carr noted. "This learning curve is quite short. The fact that an operator with one week of training and a little practical experience can train other employees is a testament to how good the [software] user interface is."

Easy Interface

Software plays a large role in maintaining efficient machines and processes. Watts-Mueller's software creates 3D contours as part of an integrated process chain. "Instead of creating the [drawing] as an isolated element," Carr said, "with 3D-Profile Plus (3DPP), the machines work with both upstream and downstream workflows. This significantly reduces production time, material costs, and errors."

The 3DPP CAD/CAM comprehensive system provides models cutting geometries, nests numerous parts to be cut on a single pipe, assigns cutting functions to one or several machines (while taking into account each machine's capacity), keeps track of each stage of the working process for each machine, and calculates and records cutting times and costs.

Users can reference 3DPP's extensive reporting functions for calculation or documentation purposes. "This robust software system can be fully integrated into any company workflow as an autonomous software system for the modeling of pipes or by importing drawings from a multitude of CAD software systems," Carr said.

After a decline in new inquiries in 2020, Watts-Mueller has adjusted how it works with customers to keep projects moving. "By being flexible with pricing and payment terms, we have been able to maintain a backlog," Carr stated. "We are cautiously optimistic for 2021. Inquiries were up in January, and conversations with prospects are positive—the indicators are good."

Piping Systems believes its Watts-Mueller installation will be busy in 2021. "We're expecting a pretty good year ahead compared to 2020," Bunker said. "I think we'll get over the COVID-19 hump by the end of the third quarter and expect things to be under control.

"We have relationships with other fabricators in place that even if we lost half our workforce we'd have a backup plan in place to continue to meet customer expectations without downtime," Bunker continued. "We've learned to plan ahead for any scenario."

For more information, call 832-701-7121 or visit www.watts-specialties.com.

Piping Systems' Watts-Mueller machine is 180' long and the largest setup Watts-Mueller has installed to date. It will increase Piping Systems' capacity to meet customer demand for heavy pipe processing and enhance safety.

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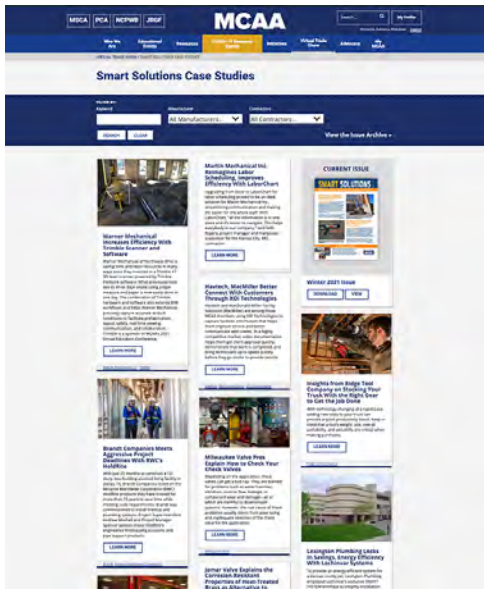

Mechanical contractors are being asked to do more on tighter budgets and schedules than ever before. Smart Solutions helps MCAA members retain their competitive edge by sharing contractor success stories.

Recent articles have highlighted how contractor and Manufacturer/Supplier Council members are partnering to do things like:

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- Leverage software to communicate with clients and employees, a critical lifeline during the COVID-19 pandemic
- Meet – and beat – tight schedules with trusted products
- Cut costs and creatively avoid conflicts with coordinated processes

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