FMD
Facility Maintenance Decisions™
Jan 2016 • facilitiesnet.com/fmd

STADIUM STARS

Facility operations team uses its experience to ensure Packers' $143 million expansion delivers water savings and overall efficiency

DIAGNOSING HVAC
Energy Waste

AVOIDING **Roofing**
Project Headaches

ROUNDTABLE:
Technician Training

RISE & SHINE.

DTZ AND CUSHMAN & WAKEFIELD HAVE COMBINED TO CREATE A NEW FORCE IN FACILITY SERVICES.

One with a 65-year track record of outstanding client service. Equipped with a workforce in excess of 14,000 motivated and well-trained people, maintaining more than 600 million square feet for over 600 clients.

C&W Services provides a full suite of self-delivered services. Our clients enjoy the benefit of a safe, reliable, comfortable and clean environment, allowing them to focus on the task at hand.

365 days a year. 24 hours a day. We rise with one goal in mind—to ensure your workplace is functioning at its full potential, allowing your business and your people to shine.

To learn more about everything we can do for you, please contact us at cwservices.com or call 888-751-9100.

JANITORIAL • MAINTENANCE • CRITICAL ENVIRONMENTS • LANDSCAPING • OFFICE & MAILROOM

C&W SERVICES

CAN ONE BOILER
bring a multi-use ski lodge precision sequencing control?

The answer is YES.

Introducing the Evergreen™ high efficiency boiler.

Next-gen 24-Zone Control | 95% AFUE energy efficiency
Stainless Steel Heat Exchanger | Easy Installation

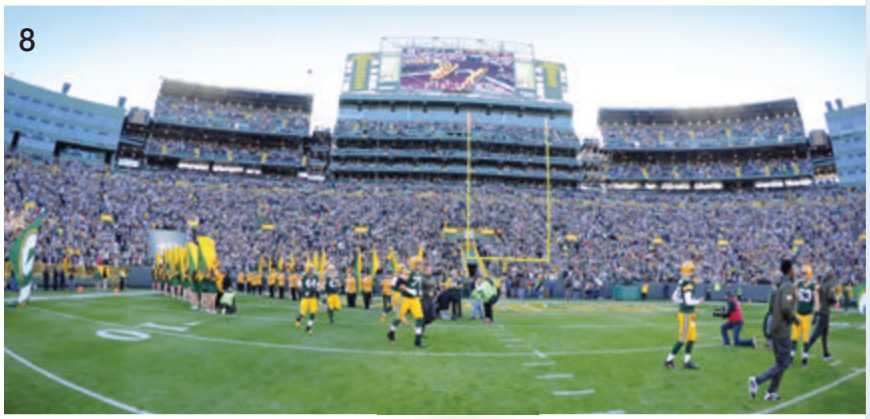
With the broadest line of high efficiency boilers for home and business, the answer is always Weil-McLain.

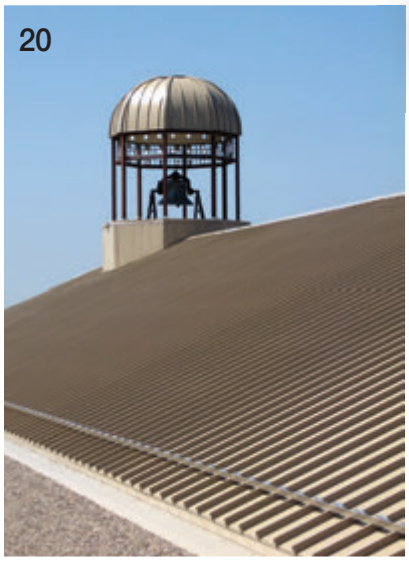
WEIL-McLAIN®

For more information, visit www.EvergreenBoiler.com.

contents

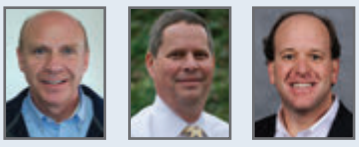
volume 24, no. 1





features

roundtable



products

online

facilitiesnet.com
Find more *FMD* content

Grease Relief

JM-1000 Mini-Jet™ clears grease fast

Starting at just $975 US

Special Introductory Offer

Spray Wand included **FREE** with purchase of complete unit.

For more Info: ***www.drainbrain.com/jets***

Quickly clear grease from clogged sinks and small drain lines with General's JM-1000 Mini-Jet. This compact, lightweight tool brings surprising cleaning power to the job - at a surprisingly low price.

Water jets use a steam of high pressure water that hits the stoppage and flushes it away. The thrust of the nozzle drives the hose down the line and gives you wall to wall cleaning action. Pulse helps slide the hose around tight bends and farther down lines.

At just 22 lbs, General's tough Mini-Jet resists job-site abuse, too. The 1500 psi pump and motor assembly are safely contained in a rugged diamond plate metal case.

Pound for pound and dollar for dollar, the Mini-Jet is a great (and small) investment.

For more information, contact the Drain Brains® at General at 800-245-6200 or 412-771-6300, or visit www.drainbrain.com/JM1000.

85 YEARS

General PIPE CLEANERS

The toughest tools down the line.™

MADE IN USA

Balance or Boldness?

References to balance come up in conversation every day — checks and balances, balancing a budget, balancing act, work-life balance. The message is clear: balance is good. But balance generally involves a tough choice — more of this but less of that, winners and losers.

Finding balance is a challenge for maintenance and engineering managers. Every day, they have to match available resources with facility problems. A little less attention to this system, a little more time and money on that component, and with some luck, the buildings make it another day.

Allocating their own time might be the toughest balancing act for managers. For example, how much time do they spend researching an emerging technology that offers promise but not a lot of proof? This question occurred to me as I researched the growing interest in drone technology and its potential uses for facilities. Given managers' limited resources, how much time can they afford to spend researching this emerging, potentially beneficial technology? Committing funds to bring in drones, after all, is a bold move that is not guaranteed to pay dividends.

The same issues arose a decade ago when infrared imaging promised facilities a leap forward in the diagnostic technology readily available to front-line technicians. It turns out that managers who took the bold step and invested in infrared imaging have been rewarded with an array of benefits.

Maybe it comes down to sensing when to seek balance and when to be bold. Maybe managers can benefit their facilities more by devoting a little less time striving for just the right balance and a little more time identifying and researching bold measures — technological and otherwise — that could lead to long-term dividends for their departments and facilities.

* * *

If you're reading this in our print edition, you see we've changed. Our new size and a refreshed approach to content aims to deliver a portable, easily accessible magazine with even more essential content, from management insights and project profiles to enhanced coverage of maintenance and engineering trends. I welcome your comments on the new *Facility Maintenance Decisions*.

Dan Hounsell, Editor-in-Chief
dan.hounsell@tradepress.com

FMD
Facility Maintenance Decisions™

EXECUTIVE OFFICES

2100 W. Florist Ave.
Milwaukee, WI 53209-3799
(414) 228-7701; fax: (414) 228-1134
E-mail: dan.hounsell@tradepress.com

For reprint pricing email:
reprints@tradepress.com

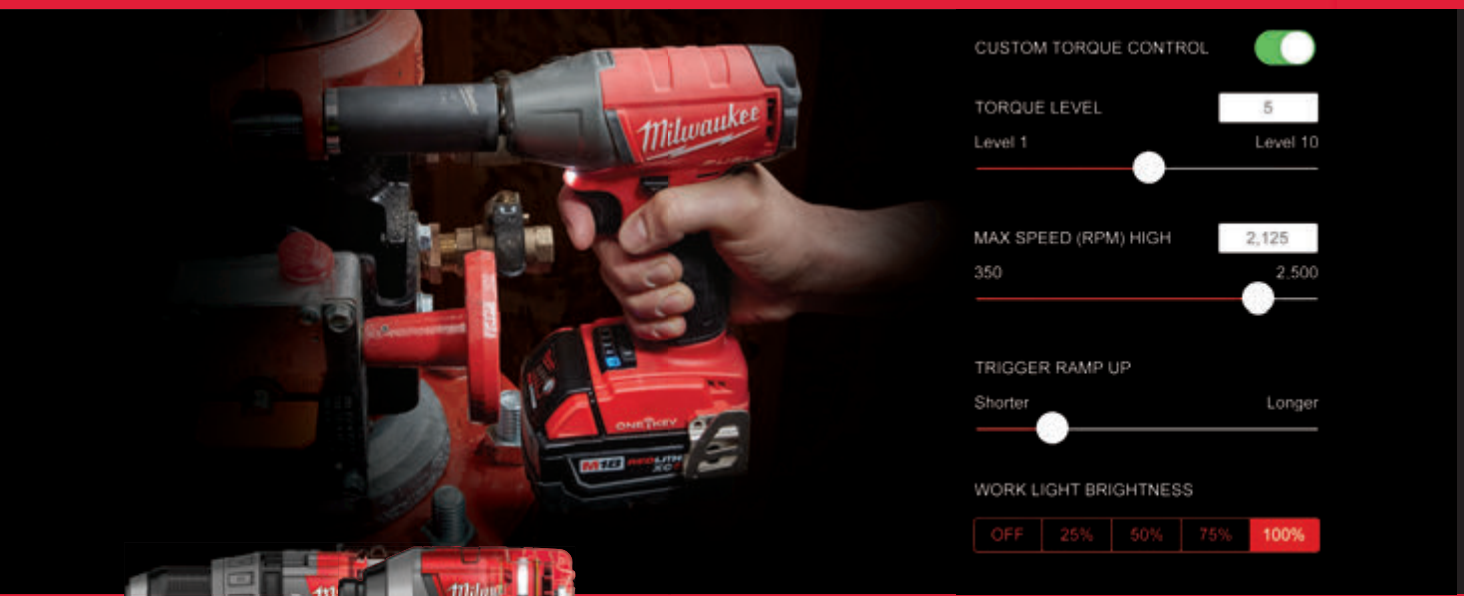
For address and other changes:
Phone 1-800-869-6882
fmd@kmpsgroup.com

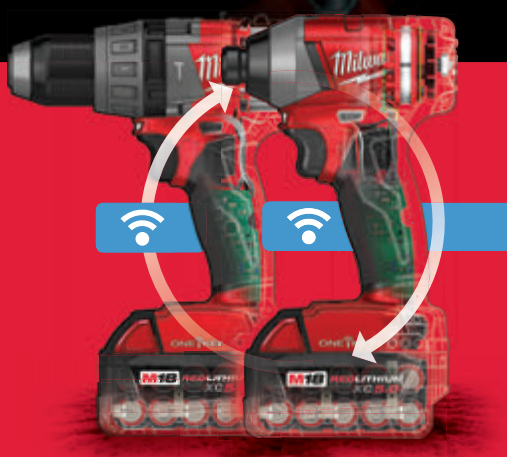
NEW

Milwaukee®

M18 FUEL™

DRIVEN TO OUTPERFORM.™





ONE-KEY™

UNLIMITED TOOL CUSTOMIZATION

1 CREATE
DIAL IN SPEED & POWER

2 SAVE
SET CUSTOM PROFILES TO TOOL

3 OUTPERFORM
WITHOUT STRIPPING, BREAKING AND BIT BURNOUT

MOST POWERFUL **FASTER SPEED** **MOST COMPACT**

DIGITAL PLATFORM FOR TOOLS & EQUIPMENT

TOOL CONTROL • INVENTORY MANAGEMENT • TOOL REPORTING

DOWNLOAD THE FREE APP NOW!
Learn More: milwaukeetool.com/one-key

Download on the App Store

ANDROID APP ON Google play

Michael Cowley, CPMM,
is president of CE Maintenance Solutions — www.cemaintenancesolutions.com. Cowley provides maintenance training, coaching and consulting services to facility and manufacturing organizations nationwide. He is a frequent speaker at national facilities management conferences.

Michael Cowley

Hands On: Managing Portable Technology

Portable technology is the latest craze to hit the world of maintenance and engineering management. Portable devices come in any shape, color, configuration, and, of course, price.

When I started in maintenance, managers and technicians used handheld walkie-talkies that weighed about 5 pounds and had an antenna that seemed to be 2 feet long. The device literally pulled down your pants.

Today's technology has evolved to produce smartphones, tablets and laptops. But while the technology might change, the pressing question for managers remains the same: How do we justify the purchase, and did we later see the benefits we anticipated upfront?

Part of the challenge is trying to determine the most effective way to incorporate these technologies into both management and field work, as well as determine the ultimate benefit to the organization. The common perception that because it is new technology, it must be better and faster, is not always the case. The first part of the process is to ask yourself why you and your technicians need the portable technology, what the users will do differently with them, and how will they make the organization better?

New tools of the trade

An essential part of the process of adapting portable technology into maintenance and engineering departments is to identify the tasks each one can perform in your specific organization to help streamline work practices.

Smartphones. The devices fit easily on your belt and don't get in the way, and most people know how to use them. They are great for sending and receiving relatively simple work requests, and the technician can respond that the problem is fixed.

Smartphones are not good for managing complex work requests. They are not good for completing preventive maintenance (PM) procedures with multiple inspection points and those that require documenting the results of the procedure. If you are a 100 percent reactive department, a smartphone might be everything you will ever need. You will never get any better or reduce your emergency work, but it will be fast.

Tablets. A tablet has everything a smartphone has and much more. Technicians can easily view pictures, schematics, parts lists, and complex PM checklists and procedures. They can be used successfully in office buildings, campus environments, and even large geographically challenged county and state governments.

Their biggest downside is size. Technicians will need a method to carry the device and hopefully keep it safe. You probably need to plan on having a replacement stock for units that get dropped and destroyed. Keep in mind once you move into the mobile device world, it will be hard to carry out business as usual without them. You must have spares and loaners available.

Laptops. These devices are the largest of the gang but probably offer the most advantages for work practices, processes and systems. You can attach all types of devices to a laptop and use CDs and other data-storage devices as needed. Their size is the largest downside. If you work from a truck, van, or other weatherproof vehicle, then the laptop might be the best device that offers the most flexibility.

Focus on process

One key question to ask yourself and your organization is this: Do we have the discipline and accountability systems in place to ensure and demand that all technicians will use the devices consistently by entering all of the information accurately that the system demands in order to produce usable data and results?

If the answer is yes — that you have the processes and systems in place to ensure technicians will use the portable devices properly — then you are ready to begin the process of purchasing and using mobile devices.

If your existing management and leadership style cannot guarantee the consistent and accurate use of the devices, you will have created a system that provides

you with bad and inaccurate data but much more quickly than before. So let's fix the process first. Your system must contain the following components and practices:

- State-of-the-art networking capability, whether it is a building Wi-Fi or a national cell phone-based system. Everything should be constantly online for instantaneous data transfer.
- If you want technicians to respond at night and on weekends — including the ability to make adjustments to building management systems — cell phone-based systems are best.
- Practices must be in place to guarantee work requests will be written for all work, not some of the work. When it comes to crunching the numbers for the boss, you need complete and accurate data.
- Technicians must fill in all needed fields on the work request per the process guidelines and documented standard operating procedures.
- Supervisors must review and approve all completed work orders before they are entered into the system. A complete set of performance measures must be in place to manage the accountability of the process. You must have measurements in place that are published weekly and monthly that show when the system is not meeting the desired performance — for example, percent of work requests compared to emergency work. With good scorecards or performance measures, the process becomes self-policing.

For managers who think that many of their problems will go away if they purchase handheld devices, I have bad news. If your existing system and process is flawed, it will only get worse when you add the electronic component. The key is to fix your process first and then buy the gadgets.

With all of that said, let me confuse the issue a little. Many of my contacts and clients across the country are rethinking their portable technology strategies.

Consider this: If your organization is primarily reactive and emergency-focused, incorporating mobile devices will speed up the maintenance process. You basically have made all of your firefighters a little quicker, and the response times should improve as a result.

While work quality, customer satisfaction, and cost effectiveness probably will not improve, you will look better when, in fact, you are not. The best of the best organizations are trying to change from reactive culture and become an organization that plans and schedules 80 percent of all the work. Only 20 percent is reactive or emergency. If you are moving toward the best in class status and perform 80 percent of all work with detailed written plans and documented work schedules, why do you need a mobile device?

Paper can work well. It's easier to read, easier to look at with the rest of the crew, and can contain more details for PM and pictures that technicians can share easily. Some managers are worried about the environmental impact of continuing to use more paper. I work with the lumber industry, and the fact is that trees — and in turn, paper — are one of, if not the only, renewable resource.

No simple or single answer exists to your questions related to the use of portable technology. Think about what you are trying to accomplish, and develop a method to monitor the way the department uses the devices in order to determine whether they are likely to be a benefit or a burden. ■

GREEN BAY PACKERS

STARS

Facility operations team uses its experience to ensure Packers' $143 million expansion delivers water savings and overall efficiency

By Dan Hounsell, Editor-in-Chief

Mention Lambeau Field, and football fans immediately conjure up images of the Green Bay Packers championship football, Vince Lombardi, and frozen tundra. While the 59-year-old stadium certainly has played a role in creating long-lasting memories for generations of fans, Ted Eisenreich is the first to tell you they are not all Lambeau Field has to offer.

"We're more than just football," says Eisenreich, director of facility operations for the Packers. The stadium has evolved since its opening in 1957, when 32,500 fans sat on aluminum benches but had only a few concession as amenities. Today, Lambeau Field contains 2 million square feet of space and features a restaurant, banquets and trade show space, a team hall of fame, a large atrium, and numerous fan suites, in addition to the team's administrative offices, locker rooms and training facilities.

In 2013, the team took on perhaps its most ambitious challenge — a $143 million expansion that revamped numerous areas of the south end of the field and added about 8,000 seats to bring the stadium's capacity to 80,375. Among the many challenges for Eisenreich and his department in the planning and oversight of the expansion was ensuring the project contributed to water savings, increased stadium sustainability, and improved overall efficiency.

Green (Bay) and growing

Though the team had modernized and upgraded Lambeau Field since its opening, the organization knew that modern pro sports fans and sponsors demanded the most modern amenities and opportunities available. With the 2013 expansion project, the team sought to meet and exceed those demands.

"It started in 2011, and we completed it in 2013," Eisenreich says. "Basically, we were looking for things we didn't have or couldn't do in the old stadium." For his part, Eisenreich and his staff knew that the expansion's plumbing systems and restrooms would be essential elements in ensuring the project succeeded.

One early step in the planning was to select the flush valves, faucets and paper and soap dispensers to be used throughout the various restrooms added in the expansion.

"With the south end zone project, we added 38 new men's, women's and family restrooms," Eisenreich says. "They include 171 toilets, 95 urinals, and about 125 lavatories. For about 50 of the toilet and urinal flush valves, we went to electronic products versus manual flush valves. All lavatory faucets are hands-free." The restrooms also feature 108 hand-towel dispensers and about 80 soap dispensers, and the 15 new concession stands feature about 65 new sinks and faucets, of which about 75 percent are hands-free.

One key consideration was minimizing water use throughout the expansion in ways that did not compromise other systems or the visitor experience to the stadium.

"We looked at a number of different options to see what we could do, and we went through the pros and cons," Eisenreich says. "The flow of the faucets is easy to control — how many gallons per flush for toilets and urinals. We tried to grab hold of some of those sustainability benefits that way."

The staff drew on its experiences in other areas of the stadium in selecting the most appropriate products.

"We look at what we have in the facility now to see if it's working and if we've had success with it," he says. "We try to use the same or similar fixtures for several reasons — one, because we did have success with it and, two, so we don't have to stock as many different parts."

They also use field tests to determine the performance of various products.

"If we're looking at something new, we get samples in and actually touch and feel it, and we'll put it in a high-use area for a month or two before we select it to see how it works," he says. "We'll also talk to people that use them. That's how we make our selections. We're looking at performance and the ease of maintenance so we have minimal repairs, and we look at the appearance. Do they fit our needs?"

Field testing was especially important for the 2013 expansion because it encompassed several different types of restrooms with different use levels.

"Every area has a different need," Eisenreich says. "Some fixtures need to be hands-free, and some don't. Some get more abuse than others, so you pick something that might be more durable. Obviously, we're always looking for water savings, so you're looking at low-flow products and those that shut off automatically. There are a lot of different considerations, but it's all really based on the area and the use that it's getting."

'We work with (Lambeau Field) every day, and we know what works and doesn't work. We do a thorough job on selecting on the front end, so on the back end there is ease of maintenance'

Experience pays

Perhaps the most important contribution Eisenreich and his staff made to the 2013 Lambeau Field expansion was the experience they gained from involvement in a host of projects over the years.

"We've been through enough projects that we have a good feel for what works and what doesn't work here," Eisenreich says. "We have four or five main guys who have been here for 20-plus years, and the rest of my crew came here after the (2003) renovation, so they've been here 10-plus years. We live it, and we work with it every day, and we know what works and what doesn't work. We do a thorough job on selecting on the front end, so on the back end there is ease of maintenance."

They put that experience to work first with their early involvement in the planning and design of the project — a role they are accustomed to.

"On a typical project, we do the planning," Eisenreich says. "So when we're working on plumbing, I'll pull the plumber in, and when we're working on electrical systems, I'll pull my electrician in. They all have their hands in the planning.

Restoration Hardware

Restoring and upgrading a restroom requires a lot of complicated decisions. Here's an easy one: Get rid of paper towels. Excel Dryer's expanded product line — featuring XLERATOR®, XLERATOReco® and ThinAir® high-speed, energy-efficient hand dryers — is available with the most options and accessories in the industry, allowing you to customize the best drying solution for your restroom environment. **Make the change today!**

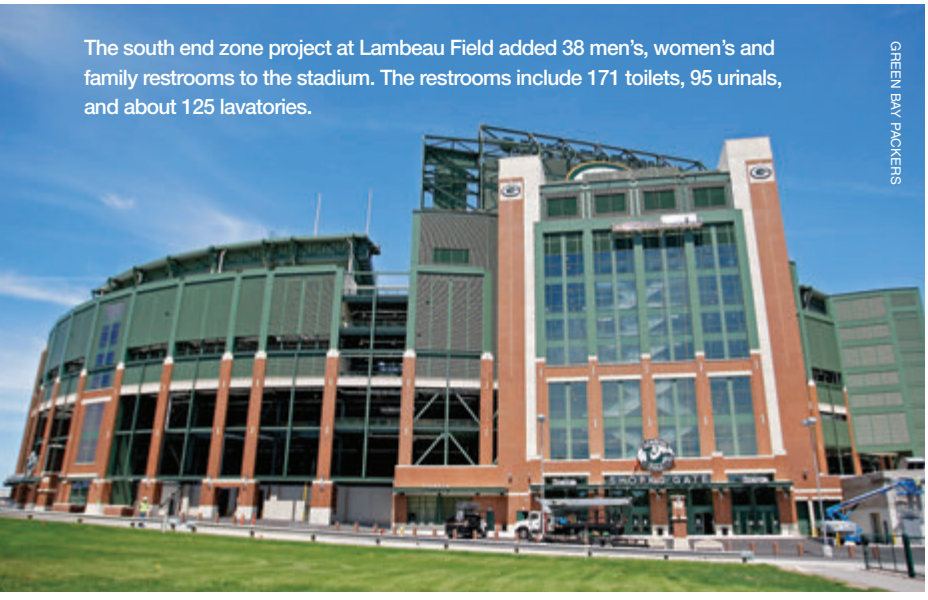
TIME TO THROW IN THE TOWEL®

800.255.9235
exceldryer.com
sales@exceldryer.com

"When it's actually being built, they're on the site daily working with the contractors. Sometimes, a contractor has a question — 'How would you like this done? This way or this way?' — and they can answer it right there. If they see something that's not quite right or not quite the way we want it done, they can address that right away. They walk the site daily.

"During the actual construction, we use all outside contractors, and we work very closely with them. Post-construction, the majority of our maintenance work is done in house unless it's a project that's just too big and we don't have the staff or the time to get it done. We have a plumber on staff and he has some helpers, so we do most of the post-construction work in-house.

Lambeau Field's architecture have presented Eisenreich and his staff with numerous challenges in seeking to design, maintain and operate a facility with many different types of areas, from luxury suites and banquet facilities to locker rooms and aluminum benches for fans. Perhaps the greatest challenge is ensuring all of these areas operate efficiently, whether they are indoor or outdoor.



The south end zone project at Lambeau Field added 38 men's, women's and family restrooms to the stadium. The restrooms include 171 toilets, 95 urinals, and about 125 lavatories.

GREEN BAY PACKERS

"One great challenge here is that we're a large facility with many indoor and outdoor components to it, so getting the water throughout the facility, many times the water needs to travel in an unconditioned space," Eisenreich says. "We have to be careful how we manage that. We're looking at heat-trace insulation on those pipes where they're exposed. It goes back to a controller so we can make sure the heat trace is on.

"In the restrooms themselves, we like to look at (plumbing) chases so we can have a whole row of fixtures and have a chase so we can get behind them and actually work on them. It makes for an easier install, where a lot of the systems can be put together off-site and brought and installed that way."

Plumbing for savings

Eisenreich says the two-year construction project went smoothly with only a minimal number of hitches, despite the complications presented by 80,000 fans moving around and through the stadium and surrounding area numerous times each year.

"Everything went fairly well," he says. "One challenge we had was floor penetrations. It's a unique facility. We have a number of levels. Some levels are exterior space, and the level below it a finished high-end interior space. So when we had penetrations through floors, we had to make sure if we had a water leak in a restroom that the water didn't get down into the floor below and flood and wreck the high-end finish.

"That was a constant challenge, but we had a process to handle penetrations, so we had to make sure everybody was on board as the building started coming together so penetrations didn't get made without taking our steps for dealing with them."

The plumbing products also delivered the intended performance and benefits — no small feat given the thousands of uses they received during relatively short periods of high-intensity use.

"For the most part, everything performed well," Eisenreich says. "The steps we took to reduce water usage seem to be working well. With one faucet that we used, we had an issue with the manufacturer tolerance, so we're in the process of getting that resolved. When you have that many components going in, you always get something that isn't quite right. But the manufacturer has been good about it."

The plumbing products enabled the facility to use water more efficiently, though Eisenreich says the organization stayed away from setting water-savings goals as a result of the expansion.

"We didn't set goals that way for specific amounts," he says. "Instead, we said, 'Let's look for any ways we can save water. Then let's evaluate those and see from a functionality standpoint whether that makes sense.' Too many times, people focus on strictly saving water, and it causes other issues down the road.

"For example, we have nine floors in some areas. We have booster pumps to help our system, so we have to make sure we have the water to do that. That all affects your fixtures. If you don't have the proper water flow, do your drains function the way they should? Sometimes, you try to cut back on water usage, and you hurt yourself in other areas.

"Our main focus was not to set a specific amount that we're trying to save. Let's look at each individual component of the plumbing system to see where our opportunities are to save water."

The knowledge the department acquired related to specifying products, planning renovations and expansions, and ensuring post-installation performance turned out to be essential for the success of the 2013 expansion.

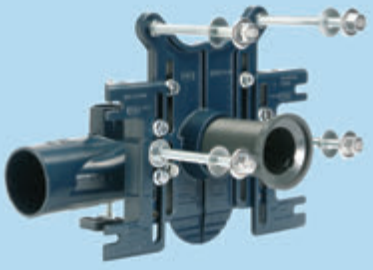
"We learned a lot of lessons on previous projects," he says. "My staff has a number of years of experience, so all the challenges and horror stories that we could tell from previous projects or post-project problems. I mentioned the plumbing chases and how we heat those chases. In the past, we might not have had proper ventilation through those and had freeze-ups. This time around, we learned from those experiences, and we designed and built those differently.

"With every project we do, we learn something new, and we incorporate that into the next project. We've only been in it three years, but for the most part, we've had very, very few issues." ■

ZURN®

One Choice. One Zurn.

NEW Aqua-FIT®
Modular Sensor Faucet



NEW EZCarry®
High Performance Carrier System

Evacuates waste nearly **twice** as far.

Zurn is the only manufacturer to offer a high efficiency carrier and a 1.1 gpf wall bowl system, providing a complete solution with labor savings and added performance from rough-in through finish trim installation. This high efficiency restroom solution achieves industry leading line carry that no other manufacturer can provide.

High Efficiency Toilet and Carrier Paired Performance System
EcoVantage® 1.1 gpf [4.2 Lpf] and EZCarry®

1.855.ONE.ZURN
www.zurn.com

Find us in MasterSpec

Product Focus

Energy Efficiency: **Looking for Trouble**

New-generation diagnostic tools puts enhanced technology in the hands of technicians

By James Piper, P.E.

As the pressure continues on maintenance and engineering managers to eliminate energy waste within institutional and commercial facilities, many managers are turning to a new generation of diagnostic tools designed to help front-line technicians detect small problems before they become larger and more costly.

While many maintenance and engineering departments have used earlier versions of these diagnostic tools, the new-generation technology offers technicians a higher level of sophistication and ease of use.

These diagnostic tools — infrared imagers and electrical test equipment — also deliver several essential benefits for organizations. They help to reduce energy waste related to HVAC and electrical systems and other building components, and they improve the reliability of these systems, resulting in fewer service interruptions and reduced maintenance costs.

Infrared insights

Infrared thermography is a non-destructive, non-contact technique that uses an infrared detector to map thermal patterns on the surface of an object. They operate on the principle that any object with a temperature above absolute zero emits heat.

Thermal imaging units detect this heat and translate it into either a temperature reading or a thermal image of the object. These units are particularly effective because they can detect a range of building issues that are invisible to the eye, including heat loss, water leaks, air leaks, moisture intrusion, and construction defects.

Technicians have used thermal imaging devices for energy audits and energy-efficiency studies for more than 30 years. They also have used them to identify abnormal heat losses through building components, such as walls and roofs, and through gaps around building envelope openings, including windows, doors, pipe penetrations, and HVAC ductwork.

Early-generation systems were large, expensive and difficult to use. Today's systems are compact and simpler to operate. They also can readily transfer data to the facility's computer system for analysis and storage. Multiple images taken over months or years can help to track the way losses are changing with time.

Departments can select from among three types of thermal imaging units: spot radiometers, thermal line scanners, and thermal imaging cameras. Each has its advantages for particular applications.

Spot radiometers are the simplest and least expensive units. They show the temperature of a particular spot

HVAC

Daikin Applied

The air-cooled Trailblazer scroll chiller series expands its availability from 30-180 tons to 240 tons. The units are designed for applications in K-12 schools to meet reliability, budget, and maintenance needs. An aluminum micro-channel heat exchanger helps reduce operating costs and improve efficiency. The line surpasses ASHRAE 90.1 2013 and FEMP 2012 standards and qualifies for LEED refrigerant management credit.

Trane

Sintesis air-cooled units are designed to reduce environmental impact with next-generation refrigerants and high-efficiency operation. The chillers are available in 115-500 tons and use R-134a or DuPont Opteon XP10 refrigerants. The chillers use up to 40 percent less refrigerant than traditional tube/fin and flooded heat- exchanger technology, due to the micro-channel condenser coil and integrated evaporator design.

AHR Expo Booth
4700

Warm up with AHRI

HVACR and water heating performance certification program

AHRI administers certification programs for more than 40 products, including these heating products:

- Commercial and Residential Boilers
- Commercial Finned Tube Radiation
- Commercial and Residential Furnaces
- Commercial and Residential Water Heaters
- Direct Heating
- Indirect Water Heaters
- Residential Baseboard Radiation

AHRI CERTIFIED®
www.ahridirectory.org

Globally Recognized. Industry Respected.

Johnson Controls

The Quantech scroll chiller line features three models — the QTC2 and QTC3 15-175-ton air-cooled units and the QTC4 160-210 screw chillers with built-to-order variable-speed drives. The chillers offer up to 50 percent annual energy cost savings, reduce lifecycle cost, meet or exceed ASHRAE standards, and help earn LEED credit with a low-refrigerant charge. The units are smaller, quieter, and require less maintenance than past models.

WaterFurnace International Inc.

The Envision 30-ton water source heat pump offers efficiencies that exceed ASHRAE 90.1 standards. It features a modular, take-apart design that installers can move into a building in two sections, providing reduced weight, a smaller footprint, and improved maneuverability. The unit also includes a variable-frequency drive with LCD display to allow for modifying blower speeds without manual pulley adjustments.

York Chillers

The magnetic-bearing YMC2 centrifugal chillers line features units with 165-600 tons and 580-2,110 kilowatt (kW) capability. The line's features include: a 0.304 kW per ton integrated part-load value; R-134a refrigerant to enhance sustainability; deci- bel levels of 73 and lower; and maximized uptime at 250,000 tons of chiller capacity with a fast restart that brings the unit to 100 percent capacity from a power loss in 3½ minutes.

Lochnivar LLC

The Crest condensing boiler includes access to the Con-X-US mobile application, allowing users to monitor and manage multiple boilers. Using a wired or wireless connection, the platform sends alerts via texts or e-mail notifying the user of changes in system status. The app allows for remote access to all Smart Touch functions using any internet-capable device.

For more HVAC products, visit ***facilitiesnet.com/16377FMD***

on the surface of a piece of equipment or a building component. By aiming the unit at a particular spot, technicians can read the surface temperature of that spot on the unit's meter. Additional spot readings of surrounding areas can show abnormal temperature variations. Most widely used to identify hotspots in mechanical and electrical equipment, spot radiometers also can help identify areas of excessive heat loss from buildings or equipment.

Thermal line scanners show the radiant temperature of the surface superimposed over an image of the area being scanned. The resulting temperature variations help identify areas for further investigation. Thermal imaging cameras produce a two-dimensional thermal picture of a surface. The resulting image identifies not only the sources of heat loss but also their relative intensities. When used on building envelopes, units can pinpoint areas with high heat loss.

One of the most beneficial uses of a thermal imaging camera is investigating the condition of flat roofs. Areas of moisture penetration, as well as damaged or missing insulation, all show up as higher than normal heat loss. Since the cameras produce an accurate image of the damaged area, managers have the information they need to determine if the roof is a candidate for repair or replacement. Technicians also have used the cameras to document the condition of new roofs prior to acceptance, as well as to identify issues while the roof is still under warranty.

Power players

Power-quality analyzers also can help improve overall system efficiency and reduce power-related equipment prob-

lems. Building occupants, along with the technology they use and the activities they perform, have become dependent on highly sensitive electronic equipment. This equipment in turn, is highly dependent on a stable, clean source of electrical energy. Unfortunately, most building electrical systems are anything but clean. Even the power supplied to the facility by the utility is not necessarily clean.

Heavy electrical loads can cause voltage sags and momentary dropouts at start-up. The operation of non-linear electrical loads generates voltage and current harmonics that increase heating in the system and can damage sensitive electronic equipment. Ground loops or improper system grounding can easily interfere with the operation of audio, video, and computer systems. Power-line noise, either from the utility's lines or generated within the facility itself, also interferes with the operation of electronic equipment while also increasing heating in the electrical system's components.

Thermal imaging units are particularly effective because they can detect a range of building issues that are invisible to the eye, including heat loss, water leaks, moisture intrusion, and construction defects

The problem for managers is that there are so many different power issues that produce similar symptoms that it is difficult to pinpoint the cause. Beyond that, these power issues can be momentary and random. The best way to detect them is through the use of a power-quality analyzer.

Analyzers typically are connected to a facility's electrical distribution system and monitor both current and voltage in the system. They can detect and record changes in the quality of the system's electrical power, including dips, surges, fast transients, momentary dropouts, harmonics, power factor, noise, and wave shape. They can log data over a preset period of time for later analysis.

Other, less expensive test equipment can be equally valuable in reducing a facility's energy waste and operational problems. Technicians also can use handheld multimeters and clamp meters to identify and quantify parasitic electrical loads that provide no benefit to the facility's operation. These tools can help technicians identify under- or over-voltage situations, higher-than-expected current draw of electrical equipment, and ineffective or missing grounding of equipment. All of these situations can increase energy use and decrease system reliability.

Departments also have used thermal imaging technology to investigate the condition of electrical equipment in seeking to improve energy efficiency and assess equipment condition. The two most commonly used devices

BAS: Data and Diagnostics

As with thermal imaging systems and electrical test equipment, building automation systems (BAS) have demonstrated their effectiveness in helping to manage energy use within institutional and commercial facilities. Now, they are going a step further and helping operators identify and diagnose energy-related and operating problems.

This functionality is not new actually. It is improved. The systems have long been able to identify existing and developing operational issues, but they also tended to overwhelm operators with so much data that operators could not easily interpret the information the system was giving them. New-generation software has improved these capabilities.

From their inception, BAS could set operating limits for energy using systems. If a system exceeded that set limit — an air handler's supply temperature was too high, for example — an alarm sounded, and technicians then would inspect the component in question to determine the reason. Unfortunately, the number of alarms during a typical day could easily overwhelm BAS operators.

A new-generation BAS still generates alarms, but it can go much further than simply flagging a fault. Through the use of fault detection and diagnostic software, the BAS can provide information on the additional energy or operating costs, operational implications, and safety issues that result from the fault. Operators can see the impact the fault is having on operations and energy costs. This information helps them identify the most significant issues and prioritize those to address first.

Operators can use data collected by a BAS to track system performance. All systems degrade over time, and operators often modify system operating parameters to meet temporary schedule changes or operational requirements. The problem is that many of these temporary changes become permanent, even if the situation the change sought to address no longer exists. Operators can use fault-detection and diagnostic software to identify and quantify the impact of these and other energy-wasting problems that otherwise would go undetected.

— James Piper, P.E.

for these applications are the spot radiometer and the thermal imaging camera. In most cases, a technician simply needs to point the unit at the equipment or component in question. Since both types of units are non-contact, they increase the safety of the technician. By recording the results and tracking it over time, technicians can identify trends in both system loading and component deterioration before they result in a service interruption.

Thermal imaging can help to identify a range of issues in electrical equipment, including panels, circuit breakers, switchgear, transformers, cables, and motors. In all of these devices, efficiency and maintenance issues typically result in hotspots.

Loose connections, crimped or corroded connectors, overloaded circuits, and electrical imbalances all result in increased resistance. Increased resistance to electrical circuits results in localized heating, a condition readily detected by thermal imaging. Eliminating these problem spots decreases electrical losses in this system, improving its overall energy efficiency. Just as importantly, eliminating hot spots increases component life and system reliability. For accurate results, the equipment must be under normal operating loads.

For all of the above tools, managers must not overlook the need for training. Not only should operators know how to use these tools. They also must have the knowledge to understand the information the tools are gathering, as well as ways to use that information to improve the energy efficiency and the reliability of the facility. ■

James Piper, P.E., is a national consultant based in Bowie, Md. He has more than 30 years of experience with facilities engineering and maintenance issues.

CHECK OUT THIS LINEUP

NOW, THERE'S A LOCHINVAR CONDENSING FIRE-TUBE BOILER FOR NEARLY EVERY APPLICATION!

We've re-defined the standard for fire-tube performance, and now we have you covered!

- 29 modulating/condensing boilers from 55,000 to 5 million Btu/Hr.
- Industry-leading turndown and innovative control platforms
- Application versatility, installation flexibility and all the high-efficiency options you need
- CON·X·US™ gives you remote connectivity with SMART SYSTEM™ controls. Use your smart device to monitor boiler status and modify settings from anywhere in the world!

SEE US AT AHR EXPO
BOOTH #4300

AHR EXPO INNOVATION AWARDS 2016
HONORABLE MENTION

KNIGHT® HEATING BOILER

55,000 to **399,000**
BTU/Hr.

Up to 95% EFFICIENCY

NEW Models – The Perfect replacement for Cast Iron!

FTXL™ FIRE TUBE BOILER

399,000 to **850,000**
BTU/Hr.

Up to 98% EFFICIENCY

No Other Condensing Boiler Scores Higher.

ftxlboiler.com

CREST® CONDENSING BOILER

750,000 to **5,000,000**
BTU/Hr.

Up to 96.2% EFFICIENCY

Equipped with the patented Wave™ fire tube.

CON·X·US®
Now Standard on CREST®

CON·X·US® REMOTE CONNECT

CON·X·US mobile communication is optional on KNIGHT® and FTXL™ boilers, standard on CREST®. Watch our CON·X·US video on Youtube.
Get fire tube training & more at LochinvarU.com

DESIGNED ★ ENGINEERED ★ ASSEMBLED USA

Lochinvar®
HIGH EFFICIENCY BOILERS & WATER HEATERS

Learn more at Lochinvar.com | 300 Maddox Simpson Parkway, Lebanon, TN 37090 | 615-889-8900


CARLISLE SYNTEC SYSTEMS

Factors such as drainage, durability, noise concerns and warranty considerations all figure into specification strategies for managers planning roofing projects.

Supplier Perspectives

Roofing: Avoiding Project Headaches

Establishing a strategy for post-installation maintenance can help managers extend roofing systems' performance lives

By Dave Lubach, Associate Editor

Maintenance and engineering managers hear the phrase "out of sight, out of mind" all too often when it comes to roofs on institutional and commercial facilities. Roofs are large, long-term investments for facilities, so managers often must find temporary solutions to prevent long-term problems and major leaks issues, when costs can skyrocket.

One wrong decision when deciding to replace or recover a roof can spell trouble down the road. Manufacturers have seen and heard about many problems managers must confront during specification, installation and post-installation. Perhaps the best advice for managers considering a roofing project is to plan the project as soon as possible.

"We often recommend trying to put together a five-year plan," says Brian Lambert with the Garland Co. These are capital projects. Roofs tend to be a pretty large investment, so setting that budget early, knowing which roofs need to be replaced and what kind of maintenance is required years out helps so that you know what it's going to cost (in future years)."

System selection

When moving forward with a roofing project, the potential for confusion exists among managers and building owners looking for the best solution possible.

"What I see happen often is there may not be a specification," Lambert says. "Lots of times, managers are getting quotes, and three different people are getting three different quotes for three different solutions.

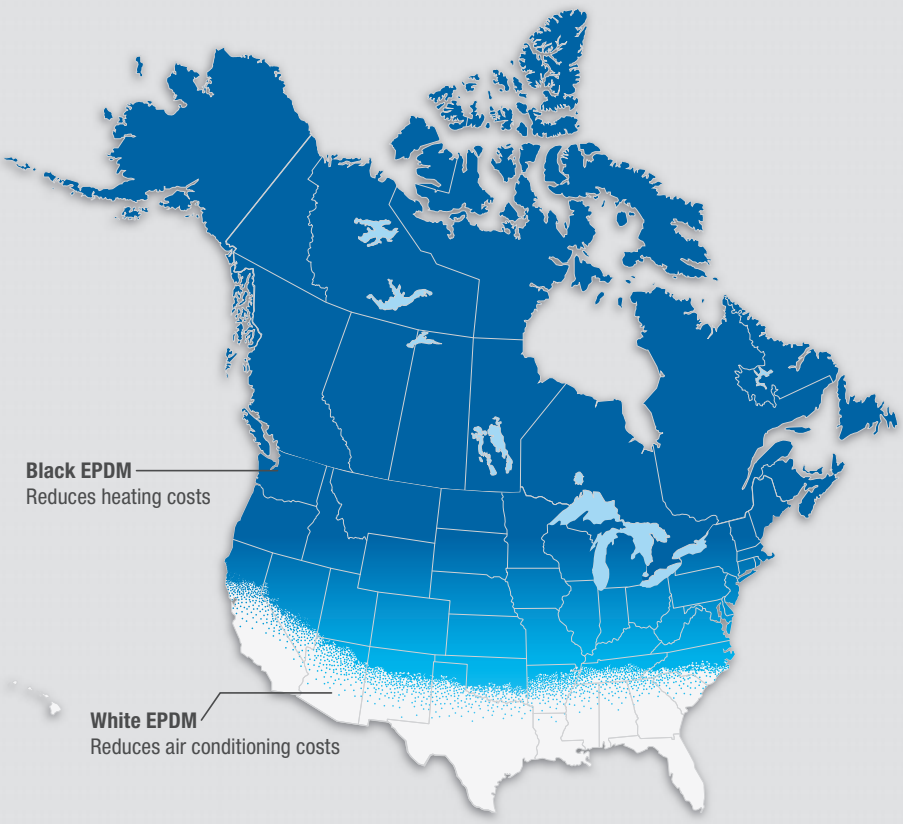
(Managers) "must have a roofing professional who can evaluate what went wrong or what went right with the existing roof, evaluate the problems you had, and be able to create a specification that hopefully alleviates some of the problems."

Hiring a roofing contractor who comes recommended by peers and who carries a solid reputation in the industry can help managers answer many of the questions that surround a roofing project.

"Roofs primarily fail at the perimeters and detailing areas, so be careful when analyzing contractor bids that the difference in pricing is not the result of reduced technical requirements at the perimeters and roof details," says Jay Thomas with Sika Sarnafil. "Having a specification developed by a roofing consultant will help you to avoid this."

Other questions to consider during the specification process include:

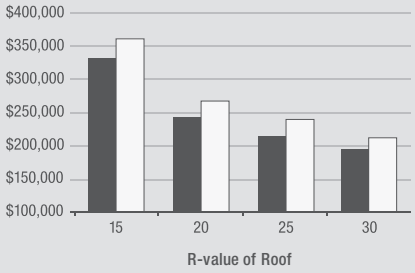
Will the roof drain properly? "Does the specification provide for proper drainage and slope to the roof?" says Tim Botkin with GAF. "A lot of times, I see managers who are building the specifications forget about if the roof system or



Seattle, WA

Energy Cost Comparison

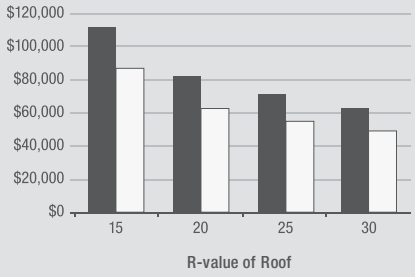
20-YEAR ENERGY COSTS BLACK VS. WHITE

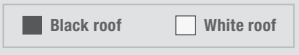


Phoenix, AZ

Energy Cost Comparison

20-YEAR ENERGY COSTS BLACK VS. WHITE





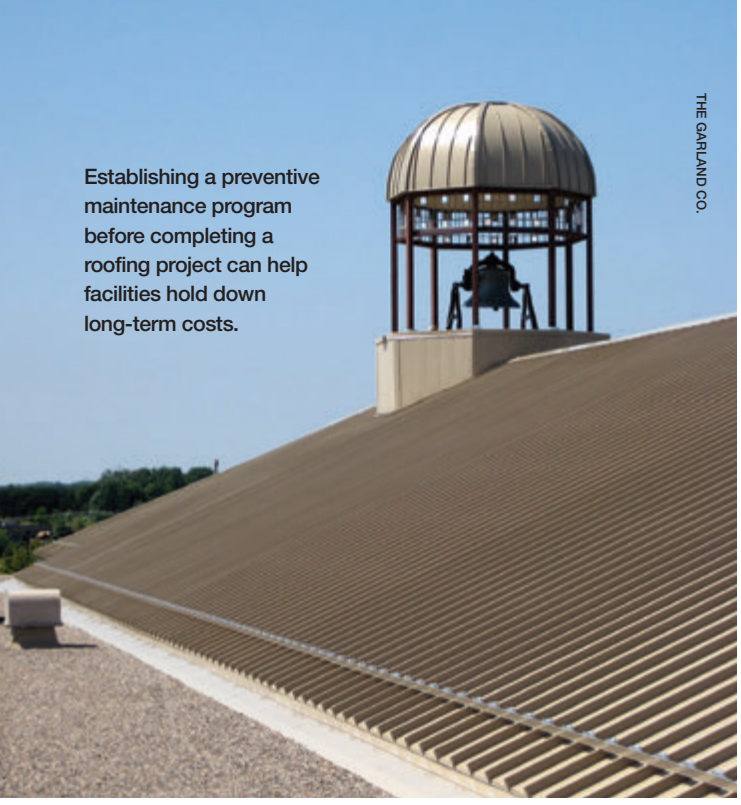
Real **Energy Efficiency** Coast-to-Coast

CARLISLE SYNTEC SYSTEMS

Carlisle SynTec Systems has been manufacturing single-ply membrane roofing materials for more than half a century. Our EPDM roof systems offer energy-efficient solutions no matter where your building is located. Dark-colored membrane for northern climates or white for warm, southern climates – with Carlisle EPDM you get proven, in-field performance, regardless of climate.

Experience the Carlisle difference on your next roofing project.

Experience the Carlisle Difference | 800-479-6832 | www.carlislesyntec.com



THE GARLAND CO.

Establishing a preventive maintenance program before completing a roofing project can help facilities hold down long-term costs.

deck really have the proper drainage to get water off the roof and get proper drainage to the drains and into the slope."

How durable is the product? Managers must consider all the activity that might take place on the roof, such as maintaining HVAC units.

"Among the most common mistakes managers make is underestimating rooftop traffic and its potential effect on a system's integrity and longevity," says Rick Ruppert with Firestone Building Products. "Ever-changing technology and renewed scrutiny of energy performance often results in increased foot traffic and machinery. Managers can mitigate a traffic log and can also install a smart lock on roof scuttle and doors to monitor activity. Applying walkway pads and supplemental paving can direct people around service points and equipment to further minimize risks to a roof system's performance."

Will the roof limit noise? "Reducing noise from outside sources is usually desirable and is best achieved by using fully adhered systems over dense gypsum-based cover boards or ballasted EPDM roofing systems," says Ron Goodman with Carlisle Construction Materials. "The added mass inherent in these systems reduces exterior noise infiltration."

What will the warranty cover? "Warranties do not guarantee that you will not have problems with your roof for the term of the coverage," Thomas says. "They only provide some sort of remedy should something happen. Roofing warranties have many exceptions in the fine print that managers should take time to understand."

Laying it down

Disruptions because of weather and other unforeseen situations are among the concerns to consider when planning a roofing project. Effectively navigating such disruptions go a long way toward project success.

"Ideally, you want to make sure the weather conditions are good for the project — that you're not trying to tear and reroof a project in the middle of winter when it can snow 14 or 15 inches and, you've got a huge problem trying to get it finished or contractors trying to do work when it's extremely cold, and you don't get the proper job you'd get under better conditions," Botkin says. "Look at what's best for your area — when you've got the best weather and drier weather or better heat."

Managers planning roofing projects should anticipate disruptions during the process, no matter the source.

"The disruption can occur from numerous sources, like loading and unloading the roof, tearing off the existing roof, or installing fasteners, adhesives and asphalt," Goodman says. "Some roofing systems are more disruptive than others, so it is good to ask these kinds of questions up front."

Disruptions during the installation process, such as delays in the construction schedule or increased noise, might interfere with building occupants. It is important that managers regularly communicate the progress of the project and alert occupants of schedule changes.

"Often, managers face hurdles in regard to communication with building occupants," says John Geary with Firestone Building Products. "It is a facility manager's responsibility to share realistic expectations and general timelines with occupants to properly prepare them for any potential inconvenience. Similarly, they must facilitate communication and coordination among the multiple building trade professionals who may be working on the project, which can present additional challenges."

Beyond installation

Waiting until leaks occur in a roof means it is too late to develop the most effective maintenance plan.

"When the roof is leaking, it's already too late to wonder if the problem could have been prevented," Botkin says. "It's important that you have a written program in place for that. It doesn't matter the type or age of the roof system. If you've got roof leaks, then you've got problems."

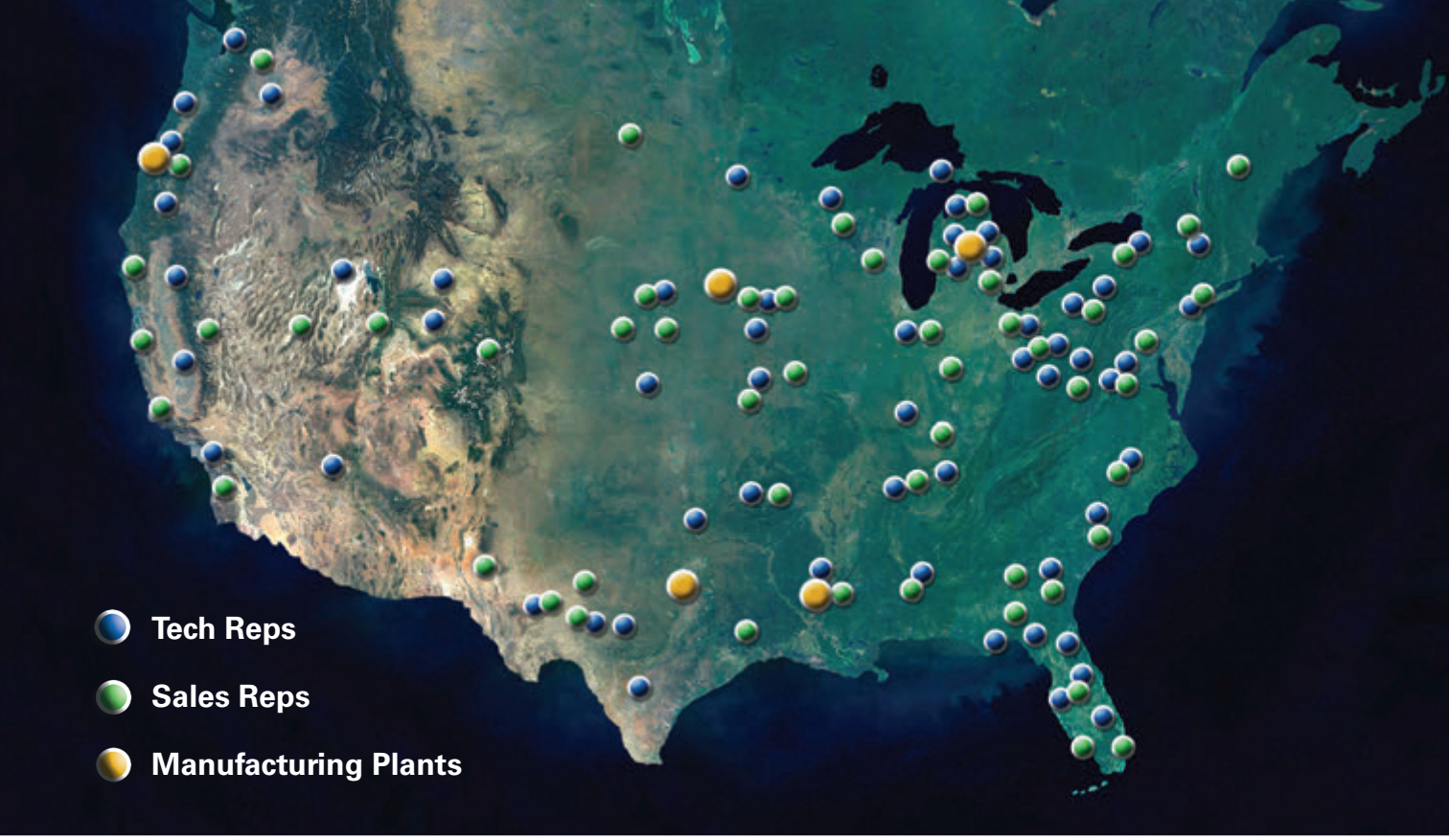
Code Compliance and Insulation Issues

Building codes differ by area and state, making it a challenge for maintenance and engineering managers to sometimes keep up with all the changes related to roofing systems and components. Insulation is one area of compliance that changes often.

"You're seeing almost every year different codes for insulation," says Tim Botkin with GAF. "A lot of cities have adopted R-30 plans to make sure they're getting energy efficient systems on each roof. It's an ever-changing thing."

The R-value is a measure of resistance to heat flow through a given thickness of material. The greater the R-value, the more heat flow is reduced. According to ASHRAE 90.1-2010, the requirements for commercial roofs with polyiso insulation range from R-20 in the Southeast part of the country to R-35 in the North.

— Dave Lubach



Duro-Last® is **keeping America covered.**

Duro-Last has a strong commitment to provide best-in-class services. We do this with strategically placed Quality Assurance Technical Representatives for service and inspections, a fully staffed Engineering Services Department and an ongoing investment in facilities, people, equipment and code approvals. We also pride ourselves in manufacturing top-notch products, and through custom prefabrication, and a complete line of compatible accessories, we offer both Time Off the Roof™ and Edge-to-Edge & Deck-to-Sky™ solutions.

Visit **duro-last.com** and **exceptionalmetals.com** or call to find out more.
800-248-0280

We stand for your success.

DURO-LAST®
THE WORLD'S BEST ROOF®

Managers who establish a preventive maintenance program for their roofs can hold down long-term costs.

"The average age of commercial roofs is 17 years, so if we can do proactive maintenance and get that to 20, 25, or 30 years or more catching problems before they become major headaches, that's the key to roof longevity," Lambert says. "From a roofing manufacturer's point of view, we always stress that maintenance matters. The more proactive maintenance that can be done versus reactive, we know that these roofs will last longer when they're cared for."

Roof Strategies: Recover, Repair or Replace?
facilitiesnet.com/15004FMD
facilitiesnet.com

Managers also should consider scheduling an inspection with the contractor and manufacturer upon completion of the project, and they should schedule regular inspections for technicians after the contractor hands off the project to the maintenance teams.

"Accompany the contractor's representative and manufacturer's technical representative during the final inspection in order to ensure that all checklist items are identified," Geary says. "If you do not have a maintenance program for your facility, now is the best time to implement one. Regularly scheduled inspections and handling minor problems before they become major ones are the best steps that can be taken to extend the service life of a roofing system."

Several proven tactics can help managers avoid the hefty costs often associated with roof repairs.

Plan ahead. "All roofing systems eventually wear out," Goodman says. "By implementing a routine maintenance program, owners can spot localized areas of concern and take low-cost corrective action that will prolong the life of the existing roof. It is also smart to establish an annual trust fund to finance a roof replacement."

Use thicker membrane. "The difference in membrane cost between a 45-mil and 60-mil sheet is usually less than 5 percent of the total system cost," Goodman says. "Some contractors and manufacturers will try to get a competitive advantage by stretching the warranty coverage on a thinner membrane, but thinner membranes will wear out faster and have lower puncture, tear and hail resistance. Think about who wins if roofs wear out faster."

Develop a maintenance checklist. "Include before and after photos," Botkin says. "You have a maintenance checklist that is performed that should be looked at a minimum of two times a year — coming out of the winter months and the summer months — to see if there are any problems. Check the seams and items that can be the source of problems down the road. The roof is out of sight (and) out of mind, and if you're not looking at these problems, they can be huge. I tell building owners all the time that it's not that $500 leak that you have a problem with. It's the damage underneath the roof." ■

Paving a Path: From Construction to CMMS

5 questions to ensure essential data on new equipment and systems makes its way to maintenance

By Aaron Groseclose, P.E.

These days, much of the design and construction process for new institutional and commercial facilities is digitized. Projects typically feature building information management (BIM) software or another three-dimensional modeling software. Ideally, the software stores valuable facility data that then migrates to the in-house maintenance and engineering departments after occupancy.

But too often, this essential data becomes an afterthought and is lost. Managers then must go through the process of recreating it once they assume responsibility for the new facility.

How can managers ensure all of the data created during the new facility's design and construction phases actually transitions into useful and usable information in the occupancy phase? The answer is through the use of a computerized maintenance management system (CMMS) and effective commissioning.

Questions and answers

While CMMS integration details vary depending on the manager's requirements and the system used on a given project, managers need to consider a series of steps designed to ensure integration occurs more efficiently. A CMMS typically contains key building, system and equipment information.

The software enables managers, system administrators and planners to parse through the data and produce meaningful benefits for the depart-

From the Field: A Protocol for Data

THREE YEARS ELAPSED after the completion of a new construction project at Georgia State University before all the data related to the facility's new equipment and systems had been entered in its computerized maintenance and engineering management system (CMMS). So when the university decided to build a new College of Law in downtown Atlanta, university officials asked their commissioning agent to gather, assemble and enter this essential data so the in-house facilities team could use the CMMS to generate work orders at building turnover.

Understanding Georgia State's previous challenges with data transfer from design and construction to maintenance and engineering, RMF Engineering focused on the CMMS as part of an integrated approach throughout the commissioning process. As design and construction progressed, the firm conducted meetings with Georgia State's facilities and information technology teams to answer five critical questions discussed in the accompanying article.

The engineering firm determined that the university's goals were to transfer equipment information into the CMMS, to use the software to automatically generate preventive maintenance (PM) work orders, and to use the construction manager's barcoding system combined with RMF's equipment images to aid in equipment identification through the CMMS.

DATA PROTOCOL

After meeting several times with the university and analyzing the construction information management processes, RMF Engineering developed a protocol. The construction manager used building information modeling (BIM) software for coordination, asset management and issue management. The firm's pre-functional checklists, combined with the construction manager's software data, provided all the information for the equipment information portion of the process.

RMF Engineering reviewed the operation and maintenance manuals submitted to the project team to find the PM procedures and schedules. For equipment that did not have a manual, the firm contacted manufacturers and provided industry best practices to develop remaining PM procedures and then assembled all the information into a spreadsheet specifically formatted for upload into the CMMS.

Finally, the firm provided the university with pictures of major equipment and copies of the QR codes the construction manager posted on all the equipment to help in-house operators integrate equipment identification with the CMMS. This strategy allowed an operator to scan the QR code at a piece of equipment and see all the information contained in the CMMS on the equipment, including a picture of the equipment after it was installed.

In the end, RMF Engineering and Georgia State University accomplished in a few months the transfer of information that previously had taken years.

— Aaron Groseclose, P.E.

ment and the organization, such as work orders, inventory management, images, equipment information, and maintenance schedules.

The value of an implemented CMMS for maintenance departments is undeniable, but it can be difficult to get started with the implementation. If the goal is to use the CMMS for automatically generating preventive maintenance (PM) work orders, managers need answers to the following five questions to successfully move forward with data integration from new construction to the CMMS.

A CMMS enables managers, system administrators and planners to parse through data and produce meaningful benefits for the department and the organization, such as work orders, inventory management, images, equipment information, and maintenance schedules

What information should the CMMS contain?

Understanding the information being targeted and the way it needs to be formatted for CMMS entry frames the rest of the integration process. Generating PM work orders requires two main information categories.

The first is basic equipment information, such as type, capacities, physical location, and warranty dates. This category can go beyond basic data to include barcodes and images. The second category is PM procedures and schedules.

The CMMS dictates the format for data entry. In the worst case, this is laborious and time-consuming point-by-point data entry directly into the CMMS. The most common method involves spreadsheet entry, which can be streamlined if other software on the project can be used to produce a spreadsheet output easily formatted for the CMMS. In the best case, the department uses a CMMS that allows direct entry from BIM software already in use on the project by either the designer or construction manager.

Where do system administrators find information?

The information's location varies depending on the data managers want the CMMS to store. The main locations for information are submittals, actual installations and other project-information software. Data submittals for equipment and products provide most capacity and characteristic information about the equipment and systems.

Operation and maintenance (O&M) manual submittals contain PM procedures and schedules. The actual installations often can provide information not found in a project's paper submittals.

System administrators must be careful about accepting submittal information as fact because changes might have caused a different piece of equipment to be installed than the unit approved during submittal. It is important to back-check submittal data against the actual installation before entering it in the CMMS.

Finally, another information system, such as the BIM, already might contain needed information. The output from a BIM might even allow for a simple conversion to the CMMS entry method.

When is this information available?

The information to be entered in the CMMS will be available at various stages of a new construction project. Approved equipment submittals are available early in the construction phase. O&M manuals typically are submitted with project close-out documentation, but managers can and should request them earlier in the project.

Verifying equipment and associated data against actual installations should follow the construction schedule so that equipment and information do not become inaccessible. It is important to determine early in the construction process when information will be available so technicians can gather it at the appropriate time. Verification is best accomplished by asking the construction team on the project when specific information will be available and then following up with them as the critical dates approach.

Who has access to this information?

The information mentioned above usually resides with the contractors and should be available to the rest of the project team, including managers. But all of the information might not have been fully transferred from the contractors to the rest of the team. Whether or not this has occurred depends largely on the project managers and how well they manage the process.

Lost information is the largest bump in the road for CMMS integration because system administrators require at least three times the amount of time to research and locate the same information.

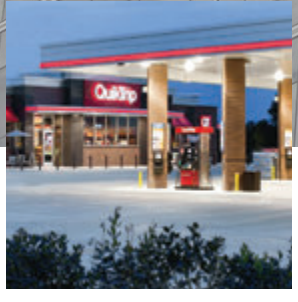
If the in-house maintenance and engineering team does not have direct access to this information, managers need a method to obtain it from the project team. This might require hiring a consultant for this phase of the process, or the scope for contractors or consultants already might include it.

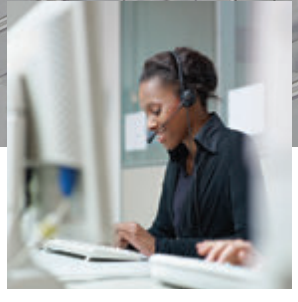
How does the information transfer?

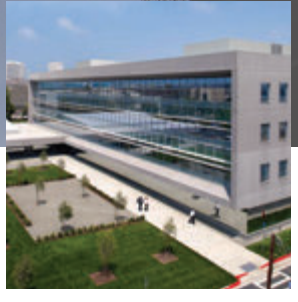
Once managers have answers to the earlier questions, the next step is to develop a protocol for collecting, assembling and entering the information into the CMMS. The earlier in a project that managers can answer these questions and

TMASYSTEMS

BUDGETS ARE SMALLER. DEMANDS ARE GREATER. WE HAVE A SOLUTION.







PROVEN IN FACILITIES MANAGEMENT FOR MORE THAN 25 YEARS.

TMA Systems develops configurable maintenance management software solutions for facilities management professionals. Clients receive support from TMA service specialists that are trained to solve problems and improve efficiency – with one goal in mind, which is to make your organization operate at its highest level. **TMA Systems works where you work.**

MAINTENANCE MANAGEMENT SOFTWARE **tmasystems.com**/industries/corporate Contact Us: **800.862.1130**

develop a protocol, the smoother and more successful the process will be.

If answers to these questions come too late in the project, data collection and transfer will take substantially longer, and some of the information might not even be available. The largest part of developing the protocol is determining who will lead this process.

Data champion

Almost anyone who is on the project team can act as the leader of the process of collecting and entering equipment and system data into the CMMS, but not every team member is in a position to perform the tasks as efficiently as others are.

Many projects now use the commissioning process to serve as the champion of this process, and as a result, the commissioning agent serves as the leader because he or she is present in all of the design and construction processes and overlaps with many of the steps mentioned earlier.

The commissioning agent is present in all phases of the design and construction project, reviews all project submittals and O&M manuals for accuracy and completeness, collects equipment and system data for commissioning documentation, is familiar with the O&M procedures of equipment and systems, and is in close communication with the facilities personnel throughout the project.

Due to the nature of the commissioning agent's roles and responsibilities within the project, his or her ability to help with CMMS integration should be cost-effective. If managers decide to use someone other than the agent to lead this process, they should be prepared to commit more time and money to the process.

The next most appropriate person to lead the CMMS integration process would be someone in-house. But this person's time is likely to be limited and primarily focused with working through the normal issues of construction, such as budget, schedules, and occupants.

Scoping a commissioning agent to handle the CMMS integration is the most appropriate choice. It also provides the best chance of achieving the essential goal of successfully integrating the equipment and system data to the department's CMMS. ■

Aaron Groseclose, P.E., LEED-AP, QCxP — aaron.groseclose@rmf.com — is a commissioning engineer an engineer in the Atlanta office of RMF Engineering with nearly 10 years of experience in the design, analysis and commissioning of HVAC, steam, chilled water, plumbing, lighting, and electrical systems. His responsibilities involve design review, functional performance test development, system functional testing, troubleshooting of system issues, leading of commissioning meetings, and facilitating project team communication.

Roundtable

Technician Training

Providing training for front-line technicians ranks among a manager's most important duties. Managers offer strategies to ensure technicians keep pace with the demands of changing facilities

By Dave Lubach, Associate Editor

Eric Albright,
Maintenance Manager,
Frito-Lay Facilities,
Plano, Texas

Neal DiChiara,
Director of Facilities
Maintenance, University
of Alabama

Bob Wilkinson,
Director of Maintenance
and Operations, Frederick
County (Md.) Public Schools

Institutional and commercial facilities evolve, technology marches on, and regulations and standards change regularly. To meet the technician training challenge that these issues create for departments, maintenance and engineering managers discuss their tactics and strategies.

Q What are the biggest technician training challenges you face as a manager?

DICHIARA: Time and money — dedicating the time and securing the funding. In maintenance, emergencies pop up every day, and shutting down for training exposes you to the risk of not being able to respond to an emergency appropriately. It can be tough.

ALBRIGHT: The biggest issue I have is with coverage training. The technicians all want to be the go-to technician for any event or situation that occurs on a given system. They get to the point that they understand their primary system inside and out and can solve any issue that comes up. The issue is getting the technicians to understand their backup systems just as well.

WILKINSON: For me, the primary challenges are identifying an appropriate scope and solidifying the classroom training with post-training application. In the past, we've initiated training in response to known deficiencies or in response to specific requests from our technicians. Probably the best example I can give is training in variable-frequency drives (VFDs). The problem was, in some cases, it was only after the training when we realized the training was too detailed, and it was difficult for the technicians to absorb everything from theory to troubleshooting and repair.

Q What building systems and components present the greatest training challenges?

WILKINSON: HVAC (systems are) the biggest challenge because they tend to be the most complicated systems and because minor malfunctions tend to be the most noticeable among our building occupants. We're in education, so we try to maintain the ideal learning environment. Every classroom may not be perfect, but we try to maintain the ability for each classroom to support instruction. The last thing we want to do is interrupt instruction. Building automation systems (BAS) are also very complex and something we've struggled to get training on.

ALBRIGHT: The walkaround. I'm one who worked my way up through the ranks and am now the manager. I have learned over time, and lots of it, that the sounds of your building, rotating equipment, loaded equipment — it all whispers to you. If you walk through every day with your headset off, you get used to the sounds, smells, shadows, and the intangible items. When something is not operating right, it tells you. You can set your BAS or energy management system (EMS) to tell you that something is occurring before it has an impact, but I have found that in many cases these little things as you walk through the building let you know there is an issue before the alarms on your BAS or EMS systems. Getting the technicians to believe this and really do a walkthrough is the biggest challenge that I face.

DICHIARA: Door hardware, whether it's automated or standard. It can get pretty complex. Components, auto-openers, ADA access, sliding doors, rolling doors — they change a lot because of new technology. They're becoming more complex.

Q Which styles of training do you think are most effective?

DICHIARA: I feel like manufacturer-led training has been the best for us in the past, simply because they have all the information and technical expertise about products. They really know their stuff, and they are experts on their products.

ALBRIGHT: We use third-party (training) on new equipment. Then I rely on staff-to-staff training. The best person to pass on information is the one that has the most knowledge on the equipment. I like the idea of the backup person doing the training, with the primary person supervising the training. That makes the backup person know the equipment thoroughly. But I have not been able to implement that in this location. The primary technician is always responsible for the documentation on the equipment and the backup I like to have as the trainer on the equipment.

WILKINSON: If we can afford the time and the money, the best thing to do is to send them away to a training location because there are minimal distractions. Typically, that third party has a situation like a lab set up where (technicians) can actually get hands-on experience. When they do training in a classroom, they can't get hands-on experience. When they do the training at our site, they can only do a limited manipulation of the equipment but at the manufacturer's site or a third-party site, they can play with something without the fear of damaging it. We've also gotten a lot of dividends from having architectural engineers come in to do training. There's sort of an inherent skepticism between technicians and architectural engineers, but once the architectural designer comes in and explains why their design is the way it is and establishes their credibility, our guys really soak up that information. We've also had a lot of success in post-construction training, where the engineer will come in and tell our people 'this is how the system operates,' In peer-to-peer training we've had tradesmen who are aspiring leaders to coordinate and conduct training. It's good because in our area we have eight different teams distributed throughout the geographical area of our county. They don't get to interact a lot, so when I get the electricians and plumbers together, they get more familiar with one another and they can share ideas across the trades. In the education system we hear about different studies mixing the generations, putting baby boomers with millennials, and peer-to-peer training lets us leverage a dynamic that otherwise we wouldn't be able to do.

"5 Minutes With" podcast on technician training: ***http://bit.ly/1Ue7Gcj***

facilitiesnet.com

Q How have continuing changes in building technologies impacted your approach to training?

WILKINSON: I feel like we need more and more training, and we need specialization because there are systems like fire alarms and automation systems that I really can't expect all of my technicians to understand. I may not expect all my electricians to understand, but I need to designate certain people and get them training on that specific system. For some of them, it's so detailed they have to specialize, and if they don't deal with it on a regular basis, they're going to forget it. I'd rather have one guy really good at fire alarms and who does nothing but fire alarms, rather than try to have 14 electricians try and operate the fire alarms.

ALBRIGHT: I find that the continuing changes affect the alarms and control side of the house more than technicians. Facilities will always be a reactive group. But it is management's responsibility with the technology changes to keep making the reactive side of our daily job less the norm. The technology lets us know that there is an issue arising with a piece of equipment, at which point we go into an event-based preventive response instead of a failure-reactive response. Technologies can go too far, as well. Just because you can control to the point of a pin does not mean that you have to, and it definitely does not mean that you alarm to that level. As control gets tighter and tighter, we need to keep in mind what we need to maintain. Controlling an office to one-tenth of a degree is not needed or

From the Field: Building a Training Program

Maintenance and engineering departments routinely struggle with front-line technician training. From financing and technology to content and time commitments, training creates challenges for managers who know they must address the issue while staying focused on their departments' core responsibility — building maintenance.

For Duke Realty, a commercial real estate management firm based in Alexandria, Va., the list of challenges includes a workforce with varied experience and skill levels. The department's solution was to implement comprehensive technician training based on a thorough review of the organization's resources and needs.

Thomas Nettle Sr., the company's senior operations manager, says the process provided valuable lessons that managers facing similar challenges can incorporate into their planning:

- **You do not know what your staff knowledge level truly is until you vet it.**
- **You cannot fairly or sensibly achieve your goals, company requests and requirements if your staff does not understand what is expected of them and unless you know what they are capable of.**
- **You learn what staff changes you have to make, and you can evaluate how best to place your staff.**
- **You get a clear picture of what your staffing needs are.**
- **You learn the true value of each staff member.**
- **Your team becomes stronger and more reliable.**

For the complete text of this article, visit facilitiesnet.com/14860FMD

— Dan Hounsell

energy efficient, but then 2-degree swings in temperature are not good either.

Q How receptive do you feel top facility executives are to technician training?

DICHIARA: My bosses are extremely receptive. They are both retired military, and training is a way of life for them. They understand the value of it and are proponents of getting a more formal training program established. Across the board, all universities want the same thing. Whether they get to do it, I really don't know. The big universities that I come into contact with are trying their best to do it.

'You can't just hold training under the banner of professional development and expect good things to come out of it. It's more about the individual as to what they can expect and what they demand'

WILKINSON: In our case, we've enjoyed an implied appreciation. No group that focuses on education is going to put down training and education. We've really benefited from top leadership that has supported professional development in all forms, but it can change from leader to leader. We've had some who've said, "Just do it. There's benefit in any form of training." We've had others who've said, "I want training to be more targeted." You can't just hold training under the banner of professional development and expect good things to come out of it. It's more about the individual as to what they can expect and what they demand before they launch into some training effort. ■

Ask the Drain Brains

By Marty Silverman
General Pipe Cleaners

Clearing Ice Clogs with Water Jets

Q. Last winter, we had to deal with a bunch of frozen stacks and waste lines, not to mention the usual frozen water lines. I used a torch for the frozen water lines, but what about the frozen stacks?

A. Using a blow torch to clear ice clogs is very dangerous, and 4" stacks are too big for conventional pipe thawing machines. Have you considered using a water jet? The high pressure water cuts through the ice blockage, as well as grease, sand, and debris. The high water flow flushes it away quickly for a thorough cleaning job.

Even with cold water, a 3000 psi, 4 gpm gas jet can clear a 4" line at about one foot per minute. Smaller electric jets will take longer, but will still easily clear the ice clog. If you heat the water, it will slice through the ice clog like a hot knife through butter. But be careful not to let the water get too hot. Temperatures above 160 degrees can damage the pump. Some jets come with a thermal relief valve to protect the pumps from hot water damage.

You can see a video showing water jets slicing easily through an ice block, as well as clearing grease, sand, and debris, at **www.drainbrain.com/jets**. fumes could be hazardous, while the jet stays safely outside.

For more information, or to ask a question, visit www.askthedrainbrains.com or email info@drainbrain.com.

trends

OSHA Update: Steps To Safety

Changes in penalties, deadlines and requirements related to workplace safety add to the complexity of challenges facing managers

By Jeffery Camplin

No issue is more important to maintenance and engineering managers than the safety of front-line technicians. No issue is more challenging, either, given the nature of technicians' work and the complexity of the institutional and commercial facilities and systems for which their departments are responsible.

To achieve the goal of protecting technician safety, managers need to pay close attention to developments related to the Occupational Safety and Health Administration (OSHA) and effectively managing safety within their organization.

Penalties and deadlines

OSHA will increase its maximum penalties associated with regulatory citations by up to 150 percent in 2016. The Obama administration had been prohibited from increasing fines to keep pace with inflation. But in November 2015, President Obama signed legislation allowing OSHA to raise penalties annually to keep pace with the Consumer Price Index (CPI).

An initial adjustment in penalties will significantly increase in late 2016 to align with the 25-year change in the CPI. This change means the current maximum fine of $7,000 for other-than-serious and serious violations could increase to nearly $12,500. More significantly, penalties for repeat or willful violations could increase from $70,000 to nearly $125,000. A rule-making process to be completed no later than Aug. 1, 2016, will determine final penalty amounts.

OSHA's Hazard Communication Standard 1910.1200 has been one of the most cited safety standards during workplace inspections.

In 2012, OSHA revised its Hazard Communication Program requirements to align better with the Global Harmonization System, which provides criteria for the classification of health, physical and environmental hazards. It also specifies the information to include on labels of hazardous chemicals and material safety data sheets, which are now called safety data sheets (SDS).

OSHA also has revised labeling and signage requirements associated with hazardous chemicals in the workplace. Managers already should have trained their employees on the new OSHA formats for chemical SDSs and chemical container labels by Dec. 1, 2013. The next big compliance date for the new hazard communication standard requirements is June 1, 2016, when managers will need to have updated their written hazard communication program to meet the revised OSHA regulations.

Employers with employees exposed to hazardous chemicals in the workplace must have a written hazard communication program. In July 2015, OSHA issued a compliance directive to its compliance officers on ways to cite employers for violations to the revised hazard communication standard. The directive addresses several items managers must address in a written hazard communication program:

Chemical inventory. The inventory must include a product identifier for each chemical known to be present that aligns with the SDS and label. The inventory can cover the entire facility or individual work areas, and it must include all chemicals present, even if the chemicals are stored or not in use.

Non-routine tasks and unlabeled pipes. If applicable, the program must cover the methods the employer will use to inform employees of the hazards in non-routine tasks, as well as hazards associated with chemicals contained in unlabeled pipes in their work areas.

Multi-employer worksites. The program must cover methods to provide the other employers on-site access to SDSs for each hazardous chemical to which the other employees might be exposed. This includes the method of informing other employers about any necessary precautionary measures to protect employees, as well as ways to inform other employees about the labeling system used.

Program availability. How is the written program available to employees, employee representatives and OSHA representatives upon request?

Labels and other forms of warning. This component must include: a designation of the persons responsible for labeling on shipped containers and of the persons responsible for workplace labeling; descriptions of the labeling system used and of alternatives to labeling for workplace containers where applicable; and procedures to review and update label information when necessary for employer's workplace labeling.

Survey: Readers sound off on regulatory compliance
facilitiesnet.com/15631FMD
facilitiesnet.com

Safety data sheets. The program must designate the person responsible for obtaining and maintaining the SDSs. It also needs to define the way SDSs are to be maintained — in notebooks in the work area, in a pick-up truck at the jobsite, etc. — as well as procedures for retrieving SDSs electronically, including backup systems to be used in the event of failure of the electronic equipment and the way employees can access the SDSs. The written plan also must include procedures to follow if the SDS is not received at the time of the first shipment, procedures to follow if employees suspect the SDS is not appropriate, and procedures to follow to determine if the SDS is current.

Training. The program must designate the person responsible for conducting training and define the way the training will be conducted — written, visual presentation using slides, verbal, etc. The procedures also must cover training for new employees at the time of their initial assignment and training employees when a new hazard is introduced into the workplace.

OSHA will increase its maximum penalties associated with regulatory citations by up to 150 percent in 2016

OSHA provides a guidance document that includes label requirements along with an example hazard communication program available at https://www.osha.gov/Publications/OSHA3695.pdf.

New guidance on the way

OSHA is revising its guidance to employers on developing a safety management system to minimize hazards and improve regulatory compliance. This new guidance will be available on OSHA's website later in 2016. Until then, OSHA provides a checklist that covers the key steps in developing an effective safety management program.

Develop and communicate a policy. Demonstrate management commitment by instilling accountability for safety and health, obeying safety rules, and reviewing accident reports. Conduct regular safety and health meetings involving employees, managers and supervisors. Assign a responsible person to coordinate safety and health activities. Integrate safety and health into business practices — purchases, contracts, design and development, etc. Involve employees in safety and health-related activities, including self-inspections, accident investigations and developing safe practices. Recognize employees for safe and healthful work practices.

Analyze the worksite. Evaluate all workplace activities and processes for hazards. Re-evaluate workplace activities when processes, materials or machinery changes. Conduct on-site inspections, identify hazards and take corrective actions. Provide a hazard-reporting system for employees to report unsafe and unhealthful conditions. Investigate all accidents and near misses to determine their root causes.

Address hazards. Eliminate and control workplace hazards related to engineering controls, workstation design and work practices. Establish a preventive maintenance program. Keep employees informed of safety and health activities and conditions. Plan for emergencies by creating an evacuation plan, training employees and conducting fire drills. Record and analyze occupational injuries and illnesses.

Provide training. Provide training for employees, supervisors and managers on specific safe work practices before a new employee begins work. Provide additional training for new work processes, as well as when accidents and near misses occur. Provide routine refresher training.

Managers seeking to survive OSHA inspections and avoid the substantially increased penalties for non-compliance in 2016 will be best served by developing safety management systems similar to those outlined by OSHA and ANSI. They also must pay additional attention to the approaching deadline on updating written hazard communication programs. The results will be a reduction in hazards and associated workplace risks, which in turn ensures the safety of frontline technicians. ■

Jeffery Camplin — mundycamp@aol.com — is president of CESI, a safety and environmental consulting firm in Rosemont, Ill. He is a certified safety professional, certified professional environmental auditor, and certified environmental safety and health trainer. He is vice president of the American Society of Safety Engineer's Council on Practice and Standards, which is secretariat of the ANSI Z10 standard for safety.

Standards, Systems and Safety

The key to creating a safe work environment and ensuring an organization's regulatory compliance is to develop a sound safety management system before OSHA launches an inspection.

An effective safety management system must define: the way hazards identified and evaluated; the way risks are to be assessed and prioritized; and the measures to be taken to eliminate, reduce and control risk in order to attain an acceptable risk level. A safety management system also must align each of the safety programs managers develop to comply with OSHA standards under a safety management umbrella.

To help managers minimize workplace risks and reduce the occurrence and cost of occupational injuries, illnesses, and fatalities, the American National Standards Institute (ANSI) has developed a voluntary consensus standard for occupational safety and health management. ANSI/AIHA/ASSE Z10-2012, Occupational Health & Safety Management Systems, is designed to continually improve safety and health performance. It aligns with the traditional plan-do-check-act approach for improving workplace safety and health.

This voluntary consensus standard provides the basic requirements for occupational health and safety management systems, rather than detailed specifications, in order to provide flexibility in a manner appropriate to each organization corresponding with its occupational health and safety risks.

The standard defines goals to be accomplished in generic performance terms, but it leaves the methods to each organization to develop. The standard recognizes that the risks, organizational structure, culture, and other characteristics of each organization are unique and that each organization has to define its own specific measures of performance.

Additional information on the Z10 Standard is available at www.asse.org/assets/1/7/Z10_Tech_Brief_2012_Revised.pdf.

Managers looking to understand OSHA's inspection process can learn more in OSHA's guidance document on the compliance inspection process at https://www.osha.gov/Publications/osha2098.pdf.

— Jeffery Camplin

FMD TECH CENTER

PRODUCTS and SERVICES
for commercial and institutional maintenance and engineering management

RIDGID K-1 Combination Auger

The RIDGID® K-1 Combination Auger is a compact tool that can be manually operated or powered by a drill to give operators the added force to remove tough blockages from urinals and shower drains. It features a telescoping design, 4-foot heavy duty cable, left-hand wound cable that prevents kinking, and C-shaped cutter to clear lines up to 2 inches in diameter. Drill not included.

www.ridgid.com

Electric Eel Model Z5-P Drain Cleaning Machine

The Model Z5-P cleans 1¼-3-inch diameter lines up to 100 feet while running galvanized aircraft wire inner core cable. Features include a built-in drum shaft slip clutch, upright frame on large 10-inch wheels with folding handle, rear bar that shields motor and allows for two position operation, and a steel guide tube/inner drum.

Electric Eel Mfg. Co., Inc.
501 W. Leffel Lane
Springfield, OH 45501-9985
Phone: 1 (800) 833-1212
http://www.electriceel.com

Evergreen™ Easy to Install, Maintain

The Evergreen™ from Weil-McLain is easy to install, use and maintain. Features include: Space-saving and compact; durable design with stainless steel heat exchanger with non-metallic base; quick setup with 10 heating system presets and setup wizard; ZoneStacking — up to 24 programmable zones (multiple boiler system) with no external panel required. Optimal energy efficiency yields reduced operational costs: up to 96.5% combustion efficiency; SmartSequencing maximizes energy across entire boiler system; low NOx < 20PPM certified.

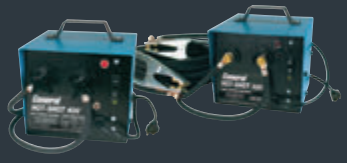
Weil McLain
(630) 560-3700
www.EvergreenBoiler.com

Cost-Effective Skylights from the Makers of the "World's Best Roof®"

As the industry leader for providing complete roofing systems, Duro-Last® Roofing now offers skylights as an additional roofing solution. With the thickest and highest density lens in the industry, Duro-Light skylights get the job done but at a value price and outstanding lifecycle cost benefits. Duro-Light skylights are not only energy efficient and environmentally friendly, but also aesthetically pleasing both inside and outside the building.

Duro-Last Roofing Inc.
(800) 248-0280
Fax: (800) 432-9331
skylights@duro-last.com

Hot-Shot Thaws Pipes in Minutes



Hot-Shot pipe thawing machines thaw pipes in minutes to eliminate tearing up floors, breaking through walls, or digging around pipes in frozen ground. General offers two models: The Hot-Shot 320 to thaw up to 100 feet of 1½ inch pipe and the powerful Hot-Shot 400 with dual level output to thaw frozen lines up to 175 feet long in 1½ inch diameter lines.

General Pipe Cleaners
For more information, contact the Drain Brains® at General at 1 (800) 245-6200 or (412) 771-6300 or visit www.drainbrain.com/hotshot

Where Smart FMs Get Smarter!

Nothing's more exciting than discovering an insight, best practice or new solution that helps you manage your facility more effectively. See for yourself. Attend the National Facilities Management & Technology Conference and Expo – NFMT 2016. It's Free!

Register For Free
NFMT.COM/baltimore

BUILDING OPERATING MANAGEMENT'S
NFMT® 2016
March 22-24, 2016 • Baltimore, MD

SPONSORED BY:

AUTOMATEDLOGIC
Avetta
C&W SERVICES
Club Car®
GP PRO™
NATURAL CHOICE®
PAULDAVIS RECOVER • RECONSTRUCT • RESTORE NATIONAL
POLARIS
SELECT HINGES® SELECT Products Limited
sodexo QUALITY OF LIFE SERVICES

product pipeline

A POLARIS INDUSTRIES INC.
Electric utility vehicle
GEM fills the gap between golf carts and trucks or vans for grounds maintenance departments. The machine features an aluminum chassis that passes roof-crush-test standards, front-wheel disc brakes, an automotive-style suspension, and maintenance-free battery options. With a maximum speed of 25 mph, the vehicle can drive on streets in most states.

B EATON
Cable-management system
Improved ergonomics, enhanced design and increased rack density highlight the upgrades to the B-Line Series Rack Cable Management (RCM) and Rack Cable Management Plus (RCM+) product lines. The enhancements maximize floor space in data centers and improve operational efficiency. The RCM line offers a dual-density vertical cable manager with a full-height door that is compatible with the RCM+ standard horizontal cable manager.

C MARLEY ENGINEERED PRODUCTS
Wall-mounted heaters
The Berko COS-E series features a compact design, dual wattage and voltage, compliance with safety standards, and an easy installation process. The Clip-n-Fit feature allows the installer to change the wattage of the heater to a lower output to accommodate any application or space. The heaters are available in 208/240 volts (V), 120 V and outputs of 375-2,000 watts.

D MASTER LOCK SAFETY SOLUTIONS
Safety tags
The S297 maintenance tags and S4810 boxed roll of tags comply with OSHA standards for padlock identification. The S297 tags can be directly attached to personal padlocks and accept a shackle up to 9/32 inch in diameter. The S4810 tags are easier to transport and store. Every box includes 100 one-time tags printed on a perforated roll of polypropylene.

E AQC INDUSTRIES
Air duct
BlueDuct is an underground system that received NSF P374 certification for R-10 thermal efficiency. The pre-insulated system consists of a traditional installation of a buried PVC-coated, spiral, sheet-metal air duct surrounded on four sides with R-10 board insulation.

F OEO ENERGY SOLUTIONS
LED lamps
The EZ LED is a direct-replacement lamp for 175-400-watt metal halide or high-pressure-sodium lamps. The lamps require no ballast bypass and no rewiring by electricians to install. The lamps operate at temperatures ranging of -40-150 degrees and contain no mercury and no ultraviolet or infrared radiation.

ROOFING

FIRESTONE BUILDING PRODUCTS

Roofing membrane

RubberGard EPDM SA with Secure Bond technology features a factory-applied, pressure-sensitive adhesive, ensuring coverage across the membrane to establish a strong bond. The technology improves installation speed and allows installation in temperatures as low as 20 degrees. The product includes no volatile organic compounds.

GAF MATERIALS CORP.

Roofing system

EverGuard Extreme TPO was engineered with solar applications in mind. The thermoplastic polyolefin (TPO) product is formulated with proprietary stabilizers and ultraviolet light absorbers that result in improved weathering performance over previous product versions.

CARLISLE SYNTEC SYSTEMS

Protective film

Sure-Weld TPO with APEEL guards the membrane surface from scuffs and dirt accumulation during installation. Durable and easy to remove, the film reduces labor costs, improves aesthetics, and enhances long-term reflectivity. The film can withstand intense heat and exposure to ultraviolet rays for up to 90 days without deteriorating.

THE GARLAND CO.

Roofing membrane

OptiMax, a thermoset polyurethane-modified membrane, is designed to become more resilient over time. The technology combines asphalt and polyurethane to create a membrane that improves performance and protection expectations. The polyurethane and asphalt combine in an active modification process involving chemically reacting the polyurethane modifier to specific molecules within the asphalt to provide enhanced performance and weatherability.

DURO-LAST

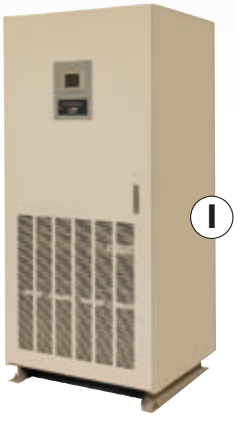
Roofing membrane

Duro-Guard Sopravap'r, a self-adhesive vapor barrier membrane, is composed of SBS modified bitumen adhesive on the bottom and a tri-laminated woven polyethylene on the top. A silicone release film covers the self-adhesive on the bottom surface. The membrane provides a walkable temporary surface that protects the decking up to four months until a permanent system can be installed.

For more information on roofing, see article on page 20

G

H



I

G **KUBOTA TRACTOR CORP.**

Walk-behind mowers

Three gas-powered models — the WG14-36, the WH15-48, and the WHF19-52 — are available in three deck widths and powered by Kawasaki V-twin engines with 14-19 horsepower. The mowers feature fabricated welded steel decks and are equipped with an electric clutch, maintenance-free spindles, and adjustable controls. Adjustable cutting heights of $1^{3}/_{8}$-$4^{5}/_{8}$ inches are available depending on the model.

H **SHERWIN-WILLIAMS**

Interior latex paint

Paint Shield, a microbicidial paint registered by the U.S. Environmental Protection Agency, is designed to kill difficult-to-treat, infection-causing bacteria after two hours of exposure on painted surfaces. The paint helps prevent the spread of bacteria that can cause hospital-acquired infections, killing more than 99.9 percent of Staph, MRSA, E. coli and VRE bacteria.

I **MITSUBISHI ELECTRIC**

Uninterruptible power supply

The AEGIS series UPS succeeds the 9900A series. The unit is a three-phase, on-line, double-conversion system featuring insulated gate bipolar transistor technology for improved performance and reliability. The series is available at 80, 100, 150, 160, and 225 kilovolt-amperes and is UL924 listed.

SCA
Restroom-management system

The Tork EasyCube uses Internet of Things-type technology to measure real-time restroom traffic and usage data with round-the-clock visibility to help managers increase tenant and customer satisfaction. The system uses restroom equipment, such as dispensers for toilet paper, towels, and soap, to help restroom maintenance teams collect data and adjust cleaning schedules accordingly.

SUPER BRIGHT LEDS
Work lights

Rechargeable 10- and 20-watt LED lights provide portable illumination without cords or outlets. Each LED is designed for three hours of use on a single charge and includes an AC power adapter. The lights emit a 120-degree beam of cool white illumination. The work lights feature weatherproof aluminum housing, a tempered glass lens, and a fully adjustable steel tube stand. (Not pictured)

ad index

Online Reader Service Card: fmdmaginfo.com

FMD
Facility Maintenance Decisions

ADVERTISING SALES

Todd Kotlarek
group director, facilities market
(414) 228-7701, ext. 577
todd.kotlarek@tradepress.com

Brian J. Terry
publisher
(414) 228-7701, ext. 529
brian.terry@tradepress.com

Greg Lynn
northeast regional director
(203) 359-4221
greg.lynn@tradepress.com

Scott Holverson
midwest & western regional director
(928) 554-4100
scott.holverson@tradepress.com

Kimberly Reed
customer & data service specialist
(414) 228-7701, ext. 441
kimberly.reed@tradepress.com

MARKETING

Tim Rowe
vice president of marketing communications
tim.rowe@tradepress.com

EXECUTIVE OFFICES

2100 W. Florist Ave.
Milwaukee, WI 53209
(414) 228-7701
Fax: (414) 228-1134

Compiled by Dave Lubach, associate editor of *Facility Maintenance Decisions* and managing editor of Facilitiesnet.com, FMD's digital home for daily updates and 24-hour access to maintenance insights. See something interesting in cyberspace? Email dave.lubach@tradepress.com.

Social Media Mavens

School District's Maintenance Team Uses Twitter, Instagram to Tell Its Story

Podcast guest
John Carnahan
Custodial Services Manager
Operations Department
Frederick County (Md.) Public Schools

Given the "out of sight, out of mind" philosophy maintenance and engineering departments struggle against, success stories often take place with little fanfare.

To get the word out in its community, Frederick County (Md.) Public Schools takes to social media — Twitter and Instagram, address @FCPSOperations — to interact with people inside and outside the school district.

"We share a number of things: new initiatives, success stories, people going above and beyond, our professional development opportunities, promotions, retirements, and lots of pictures," says John Carnahan, the operations department's custodial services manager, who adds that the social media sites also help the district monitor weather conditions throughout the county.

Listen to Carnahan discuss other benefits for maintenance and engineering departments of communicating with the public in this month's 5 Minutes With podcast at www.facilitiesnet.com/fiveminuteswith


FASTHORSES/SHUTTERSTOCK.COM

Quick Read

William Faulkner, Plant Engineer? Did you know famed writer William Faulkner once worked in the physical plant at the University of Mississippi? While writing his breakthrough novel "As I Lay Dying," Faulkner worked the night shift. Read details about perhaps the most famous maintenance and engineering employee ever at **http://bit.ly/1IRPOhd.**

maintenance alerts

Sustainable specification. A new database standardizes data for building materials and allows maintenance and engineering managers to compare and evaluate building materials based on their environmental and human health impacts.

The Quartz database, created by a collaboration between Google and the non-profit Healthy Building Network, is vendor agnostic and provides product profiles for 100 commonly used materials, such as concrete, drywall and insulation. Visit http://bit.ly/1HIsh7F for more information. *Look for Maintenance Alerts every Tuesday and Thursday on facilitiesnet.com.*

social media

MyFacilitiesnet.com
K-12 maintenance needs. Keeping up with the maintenance and repair needs of K-12 schools is tough, given the constraints on public funding and the challenges that creates for maintenance and engineering managers. Care to discuss? *Share your thoughts on this topic or strike up another chat at myfacilitiesnet.com.*

Facebook
Whoops. Even maintenance and engineering managers need copy editors every once in awhile. I found this unfortunate sign at the Orange County Convention Center while attending NFMT Orlando in October. *Like our page at facebook.com/fmdmag*

Twitter
Water woes. Blackwater, graywater, storm water, recycled water. All are terms managers need to learn in effort to curb water use. #Greenbuild2015.
Follow us on Twitter @maintenance_mag

The brand name products you need, when you need them.

We've spent over 60 years perfecting our process and product offerings, while building a coast to coast supply chain that ensures we get our customers what they need, when they need it. It's why we're focusing those resources and expertise to become your trusted property and facilities maintenance partner. Let us send you our latest Facilities Supply catalog today.

FERGUSON®
Facilities Supply

ferguson.com
1-888-334-0004

MANAGE SPENDING AND SUPPLY LEVELS BEFORE YOU EVEN FINISH YOUR COFFEE.

LowesForPros.com is a powerful e-commerce solution that lets you create custom catalogs, set spending limits and manage your Lowe's Accounts Receivable from just about anywhere. Join today. It's all about making it easier to keep your facilities running smoothly and your budget in the black.

› Sign up and start saving at **LowesForPros.com/FMD**.

LOWE'S ProServices