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"We will never totally eliminate reactive or emergency work, so the key is to minimize it."

Management Insight

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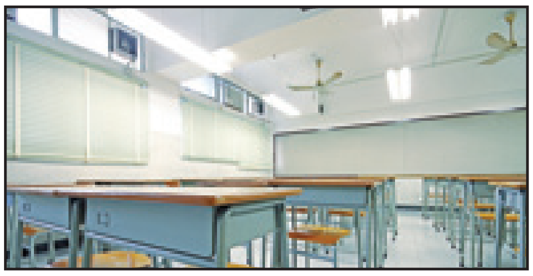

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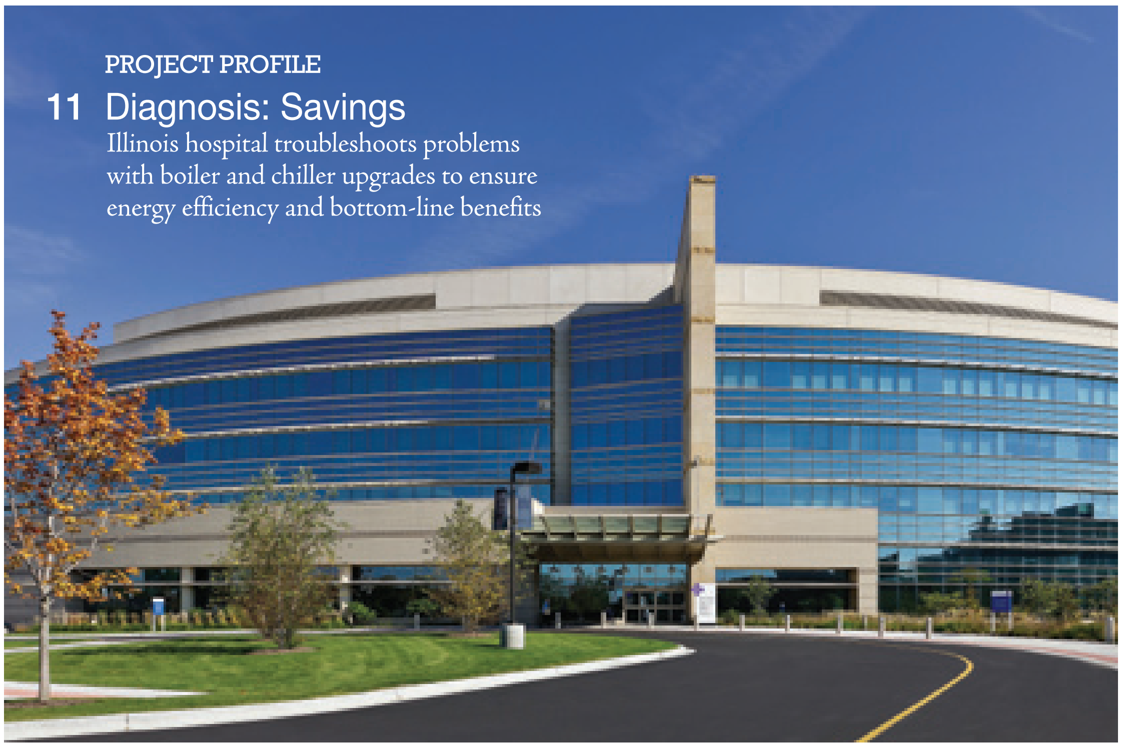

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Customer Service: The Face of Maintenance

Dan Hounsell, Editor

In the daily life of a maintenance and engineering department, customer service is easy to overlook. It's a soft skill in a field of technical issues.

It's also not the highest priority for most managers. Sustainability, energy efficiency, regulatory compliance, occupant safety and a thousand other issues seem more important than building stronger relations with customers.

In fact, many of these issues are more important, mostly because they have a more direct and larger impact on the organization's bottom line. These days, the bottom line means a lot.

But take a step back, and you realize customer service can mean a great deal to the finances of maintenance and engineering departments. Close working relations and clear communication with customers can help identify maintenance problems more quickly, keeping labor and material costs lower. They also can help identify opportunities for greater efficiency, whether related to energy or work processes.

Just as importantly, solid customer service can help managers in their quest to put a positive face on their departments, many of which suffer from a poor image within facilities, or no image at all.

Front-line technicians generally are the face of the department. So if training can help them interact more effectively with customers and, as a result, provide better and more cost-effective service, it becomes easier for managers to make the case for increased funding — or at least smaller cuts — for maintenance and engineering budgets.

The challenge for managers is making the most of their investments of time and money in customer-service training for technicians, as well as for themselves. Here are some suggestions for success:

Identify the customer. Most departments have two sets of customers, each with different needs. In hospitals, the ultimate customer is the patient. But the most immediate customers are nurses, doctors and therapists. In K-12 schools, the ultimate customers are students, the most immediate customers are teachers and principals.

Set goals. By understanding the needs of each type of customer, managers can set realistic goals for training that will help technicians meet those needs.

Select a provider. Will the training come from internal sources, such as the human resources department? Or will an outside firm or consultant do so? If managers go outside for training, get recommendations, and carefully consider the costs.

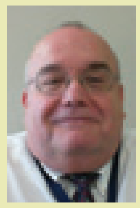
Training into benefits. Make sure the training includes practical, concrete steps for turning the investment in training into bottom-line benefits, both for the department and the organization.

Dan Hounsell offers observations about trends in maintenance and engineering management and the evolving role of managers in institutional and commercial facilities.

FIVE minutes with...

Thomas Smyth

Director, Facilities Services, Cobleskill, N.Y.



Smyth discusses the green initiatives his staff undertook to make his facility run more efficiently

Listen to the podcast at: facilitiesnet.com/fiveminuteswith

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Ask the Drain Brains – Video Pipe Inspection can save you money

By Marty Silverman – General Pipe Cleaners

Q. We've seen the ads for video pipe inspection cameras, but I don't see how I can justify the cost. Why should we own a camera instead of paying a contactor to video our drain lines?

A. Video pipe inspection systems have been the hottest item for plumbing contractors in the last decade. Years ago, only the biggest drain cleaning specialist had a camera system. Now, nearly every plumbing contractor has one - and some are doing the camera work for free - so why should you own one?

Well first, because nothing is free. You're going to pay for an outside contractor one way or other.

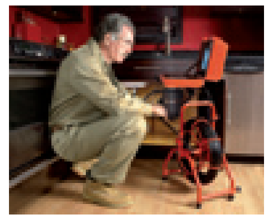
Second, owning a sewer inspection camera can save you money.

Example 1: A school bathroom toilet kept clogging. The maintenance staff repeatedly attempted to clear it, but it would clog up again almost instantly. They finally arranged for a camera inspection and found that a pager had been accidentally flushed down the toilet and was acting like a flapper valve.

Example 2: A new hotel had one room that had repeated clogged drain problems. They eventually had the line videoed and found that a dry wall nail had gone through a plastic waste line and created a clog.

Without a camera, these problems would never have been discovered. With a camera, they became an easy fix.

Further, if you are buying and selling properties, be sure to inspect the sewer system before the sale closes. Old buildings often have collapsing sewer lines that could cost you tens of thousands of repair dollars if you don't catch it first.



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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

Embracing (and Minimizing) Reactive Maintenance

I often help institutional and commercial facilities try to change existing maintenance cultures from chaos and reactive work to best in class by using more planning, scheduling and preventive work. One of the first questions to come up in this process is, how do we get started?

Maintenance and engineering managers are working as hard as they can while using all the resources they have and consuming large amounts of overtime in the process. But rarely do they see any change in the workload.

We will never totally eliminate reactive or emergency work, so the key is to minimize it. In the manufacturing world, where most of the work is confined to a plant or a couple plants on the same campus, the long-term goal for the amount of reactive work should be 10-15 percent of the total workload. In facilities, which have larger campus environments or considerable amounts of windshield time traveling between locations, the percentage of reactive work easily can reach 25-30 percent of total available manpower.

Planning for chaos

One solution to getting started on the move from total chaos to a best in class is to establish dedicated reactive or emergency maintenance crews. Their only function is to handle the unplanned chaos that is part of a facility's daily and weekly workload.

Many organizations allow all technicians or teams of technicians to handle reactive work when it arises. This strategy is fine, but it also can cause a higher level of chaos because a particular group of technicians might not be prepared for a call when it comes in, and responding might require them to drop a scheduled, or in some cases, a more important work order. Dropping other work also can cause the reactive job to take longer, and it definitely can cause the dropped or delayed job to take longer to complete than originally scheduled. It also might affect the overall quality of the finished product.

The key to success in reactive maintenance is to make sure technicians are prepared to complete the work with the right tools, parts, training and transportation. Managers shouldn't breeze over this part too quickly. Sit down with the team and talk about tools. Do they have cordless drills, electrical test equipment, ladders, etc.? Does the department have an organized parts room with the necessary parts? Are the parts staged in the proper places to make repairs faster?

Managers also need to remember one of the biggest losses in reactive work — travel time. Do technicians have appropriate means of transportation? The more quickly they complete the reactive work, the more time they will have for the proactive part of their jobs.

To make this strategy even more effective, managers can establish a dedicated emergency crew solely responsible for handling all unplanned, unscheduled, and emergency calls. Managers more than likely will notice some additional benefits once the dedicated reactive crews are in place. For example, some employees prefer one type of work, which might lead to a happier worker and which should result in a higher quality of work, whether the work is reactive or scheduled.

My preference is to keep the dedicated emergency crews assigned to reactive work for no less than a couple weeks and no more than a month and a half before rotating them back into the planned and scheduled crews. Managers must be careful, however, not to leave them assigned to these teams too long because it might affect the cross-training of the rest of the front-line staff.

Impact on staff

Right now, some of you are thinking, "My crew size will not allow me to dedicate even one person to reactive work."

That's fine. The way to handle the situation is to assign just one technician to always be the reactive person when a call comes in. The others, even if the crew is very small, always stay on their assigned work unless the designated reactive technician needs an extra set of hands or assistance in troubleshooting if it is beyond his experience and knowledge abilities. Based on the call history, managers will be able to adjust the schedule of the reactive technician.

Performing reactive work is the best and the fastest way to train and expose all of your technicians to the entire site and all of its assets

Consider this example: If the repair history indicates that the facility averages 20-30 hours of reactive work per week, then only schedule the dedicated reactive technician 10-15 hours of planned work per week, knowing the rest of his or her week will be filled with the maintenance chaos that occurs daily. The jobs planned for the reactive technician each week should be relatively short, fairly simple, and easily dropped or canceled without affecting the asset, the operation, or the outcome of the assigned task.

There is one other item I have not mentioned — the method of dispatching the work. I won't go into too much detail, but managers need to carefully consider the dispatching method and develop a process that will ensure that good work-request descriptions, that work and asset priorities are developed to assist in scheduling, and that a dedicated person or persons actually do the dispatching and scheduling of the reactive work. The bottom line is that we are trying to bring a little organization to the unavoidable chaos of emergency and reactive work.

To summarize the development and implementation process:

- Analyze the work order history to determine the number of hours per week spent performing reactive work.
- Assign a dedicated technician or technicians to be the first responder for all of these types of work orders.
- Lightly schedule the technicians' week with planned tasks to give them flexibility to handle the emergency stuff, as well as some small weekly planned work orders.
- Establish a dispatch policy and process to assist in organizing the chaos.

Constantly track the work-order types, with emergency or reactive work being one of those types to allow adjustments in manpower as needed over time. Tracking reactive work also is one of the best performance measures. It provides a quick snapshot as to whether the problems and chaos are diminishing. If so, it means that more proactive efforts, such as preventive and predictive maintenance, are having a positive effect on operation and assets.

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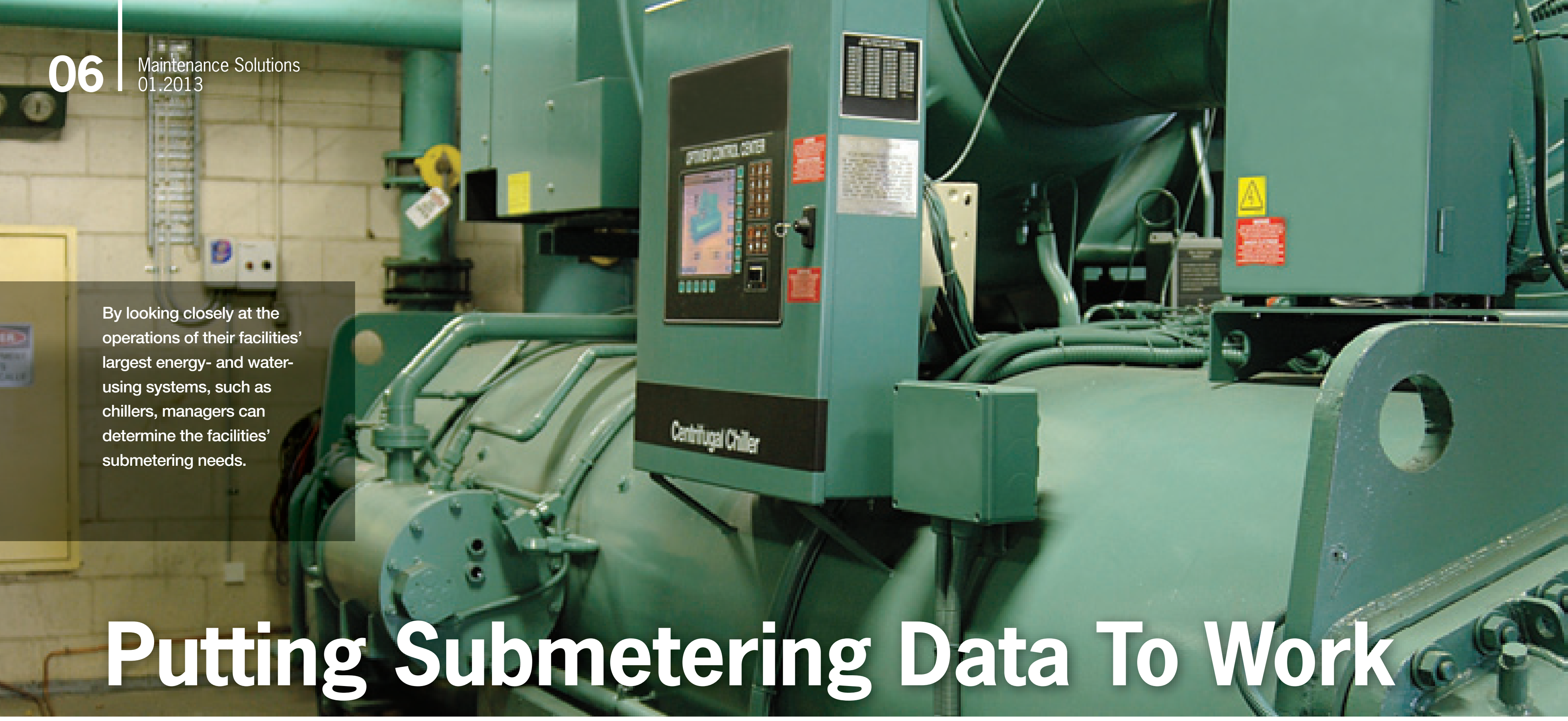

By looking closely at the operations of their facilities' largest energy- and water-using systems, such as chillers, managers can determine the facilities' submetering needs.

Putting Submetering Data To Work

By carefully analyzing information collected by submetering systems, managers can identify problems and opportunities

By James Piper, P.E.

Long gone are the days when entire campuses, office complexes, or commercial facilities used one device to meter each of their utilities. Rising utility costs have motivated maintenance and engineering managers to move to submetering as a means of tracking utility costs and then shifting those costs to building occupants.

Recently, the motivation for submetering has shifted further, from cost and billing issues to diagnostics. While metering technology still tracks individual areas and tenants to determine their shares of utility costs, submeters today are more likely to be used for energy management. Submetering has helped managers focus their conservation efforts by identifying the method, timing, and location of utility use in a facility. Managers now can accurately meter any utility, including electricity, gas, steam, and water.

The component level

This shift in motivation for submetering technology in institutional and commercial facilities has resulted in a significant change in the installation and operations of submeters. Instead of installing a submeter to measure the energy or water use of an entire office building or the space used by one specific tenant, managers today are installing submeters on individual pieces of energy- or water-using equipment.

Doing so allows managers to track the utility use of that system or piece of equipment so they can evaluate its performance. When tracked over time and changing conditions, data collected from these submeters can help identify problems and energy-conservation opportunities.

For example, cooling towers in buildings with a central air conditioning system use large amounts of water. Under normal operation, the tower must receive makeup water to replace water lost due to drift and evaporation, as well as water technicians bleed from the system to ensure an acceptable concentration level of solids in the condenser water. Typically, a float valve regulates the flow of makeup water into the tower.

The problem occurs when these valves leak or stick open, and water flows continually to the tower. This water then exits the tower through the overflow drain, where technicians might never see it. By installing a submeter on the makeup water line and monitoring the tower's water use, they can quickly identify malfunctioning valves.

Unlike energy audits, which take a snapshot of a facility's energy-using systems, submetering provides real-time data on the operation of an energy-using system, data managers can use to identify abnormal energy use and its cause.

Submetering advances

Early-generation submeters required that technicians read them manually. By tracking

SPECIFIER TAKEAWAY

Managers specifying submetering technology today are finding a significant change in the motivations behind their installation and operation. Instead of installing a submeter to measure the energy or water use of an office building or the space used by one specific tenant, as they would have years ago, managers are installing submeters on individual pieces of energy- or water-using equipment.

meter readings over time, technicians could establish a benchmark for a component's or a system's energy or water use.

Identifying and tracking performance with respect to benchmarks is a valuable tool for energy management, but it was only the first step in using submetering in this way. These meters did provide useful information on a system or component's general efficiency or on long-term trends, but they could not give managers detailed data on performance.

Today's generation of submeters is vastly different. Technicians can automatically read most of them remotely, and the meters can send data to dedicated metering hubs, which collect it and forward it to a central location for real-time monitoring. Technicians also can set up system software to monitor individual meters and sound an alarm if one goes beyond the expected range.

Managers who want to interface the submeters to an existing building automation system (BAS) have a number of options for protocols, including BACnet, Lonworks, and Modbus. As a rule of thumb, managers can expect each submeter installation to cost about $2,000.

Determining needs

Submetering systems for facilities are flexible. Systems can be as simple as one meter on one load or occupant, or they can meter every significant energy- or water-using component in the facility. Managers can start out with a limited number of meters and expand the system to additional loads at any time.

In spite of the flexibility of the systems, managers must be careful to match the capabilities of the system to the needs of their facilities. Some systems can function as a standalone installation, or technicians can integrate them into an existing BAS. Meters can be hard-wired through an existing network or connected wirelessly.

Managers can determine their facilities' submetering needs by looking closely at a facility's larger energy- and water-using systems, such as chillers, cooling towers, boilers, pumps, and air handlers, and asking these questions:

- How many of these individual loads require monitoring?
- Are they clustered or spread throughout the facility?
- Is the facility a single building, or does it consist of multiple buildings?
- If there are multiple buildings, how spread out are they?
- Is there an existing network cabling system technicians can use, or will the submetering system require a new communication system?
- Is there an existing BAS the submetering system can interface?

By considering these and other related questions, managers can determine the system architecture that is most appropriate for their facilities.

Beyond the numbers

One of the most important, yet most often overlooked, issues when considering a submetering system is managing the data that these system generate. Submetering systems do nothing more than generate data. By themselves, they do not save one Btu of energy or one drop of water.

Any savings related to their operation results from actions that managers take. Managers base those actions on information they derive from analyzing data the submetering systems provide.

The more closely and often they monitor and analyze system data, the better their options. In some cases, managers have to compare data for a system on an annual or seasonal basis. In other cases, they must make comparisons weekly or monthly, while in still others, they must make evaluations daily.

To be effective, submetering programs need a point person who is responsible for regular collecting and analyzing data the submetering system provides. This person is looking for readings that are unusual, or trends that might indicate a slowly developing issue.

In this role, the person must look at both short- and long-term implications of the data. For example, a stuck float valve in a cooling tower should make itself apparent in the data within a few days. Similarly, a chiller with fouled tubes would require the point person to compare current energy-use readings to previous readings taken under similar conditions.

In all cases, the point person is looking for both problems standing in the way of efficiency and opportunities to further enhance efficiency. ■

James Piper, P.E., is a national consultant based in Bowie, Md., with more than 25 years of facilities management and maintenance experience.

Plumbing: Strategies For Savings

Many restrooms still offer low-hanging fruit when it comes to minimizing water use and controlling utility costs

By Thomas A. Westerkamp


Installing aerators on restroom faucets is one strategy for managers seeking relatively low-cost solutions to water waste.

New plumbing products and systems have come a long way in terms of performance and water conservation in recent years. Unfortunately, restrooms in many institutional and commercial facilities continue to use outdated and inefficient plumbing fixtures, valves, toilets and faucets that contribute to water waste and drive up utility costs.

By identifying top water wasters in restrooms and fine-tuning inspection, maintenance, and monitoring procedures, maintenance and engineering managers can eliminate or minimize water waste. Beyond that they can use benchmarks to determine whether a plumbing retrofit is the most appropriate course of action.

Watching for water waste

Outdated technology, piping leaks, and seal leaks are three of the top waterwasters in restroom plumbing systems. Old fixtures — those made before 1992, when regulations on low-flow showerheads, toilets, urinals, and sink faucets went into effect — used twice as much water as newer fixtures. This combination can make it difficult for managers to hold the line on utility budgets, especially when added to continued water and sewer rate increases.

Allowing water to run when fixtures are not in use is another water-waster. This situation can result from leaking valve gaskets and fittings, as well as corroded piping. It also can result from leaking toilet seals that go unnoticed because they are hidden under floors or in walls. Only when the water shows up in another area as puddles on floors or soggy wallboard can technicians trace the leak back to the source.

Clogs in toilets, tubs, and showers that result in overflows also are culprits. Often, but not always, building occupants spot and report them right away, due to the water on floors.

Looking for trouble

Vigilance is the best defense against wasted water in restroom plumbing systems. The sooner technicians can identify the source, the quicker they can prevent water waste. Regular, preventive inspections are the surest way to spot and correct problems.

The first and least costly method to eliminate waste is to look for leaks and high flow rates and, where detected, to replace leaking fixtures, faucet aerators, shower heads, and toilet valves with the newer products that use less water. Replacing high-flow restrictors with low-flow restrictors can reduce water consumption at each faucet by 50 percent.

Another waste reducer is submetering, which measures the flows in various areas and can help managers determine which buildings or systems are the biggest users and wasters. One quick way to determine the presence of leaks is to read the meter at two-hour intervals when no water is being used. The difference between the two is water wasted from leaks. With this comparison, managers can focus conservation efforts and resources on projects and produce the largest paybacks.

Submetering savings can result from previously unidentified leaks that reveal themselves in an unusually high flow volume in a metered area. Once technicians

Bonus Info

- Proper installation and maintenance of plumbing products is critical for meeting goals related to water conservation, safety, sanitation and durability.
- Managers who are considering retrofitting their facilities' showers with lower-flow showerheads should consult with the manufacturer or a plumbing engineer who is knowledgeable about anti-scald or pressure-balancing mixing valves.

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www.facilitiesnet.com/13643ms

measure baseline flow, they can take periodic readings and compare them to the baseline.

Technicians also can compare similar areas between buildings. If two areas in different buildings have about the same number of fixtures and usage, their flow rates should be similar.

Also, some buildings collect, treat and recycle sink water as grey water for use in toilets. This strategy can substantially reduce potable water use and flow into the sewer. The sewer flow is charged automatically based on the water supplied.

Showers also can be water wasters. Technicians usually can fix leaks by removing the head, taping the threads and replacing the head. If the head is pre-1992, its flow rate is probably 3-7 gallons per minute (gpm). It is possible to reduce the flow by 50 percent or more with a new 0.5, 1, or 1.5 gpm head. Managers should consider both the restricted flow rate and the angle of spray when selecting a new, low-flow solution.

Efficiency benchmarks

Water-use calculators are useful aids in comparing one building with others in the same sector. Using the calculator is a three-step process.

First, collect use data for the facility's water bills and meters. Second, enter data into the calculator. Third, compare the data versus sector standards to identify savings. In addition to common water-use factors, they help to calculate such water savers as potential versus actual rainwater used based on annual rainfall, as well as potential versus actual grey water consumption.

One water-use-measurement firm uses the following benchmarks for daily use of potable water:

- education facilities – 0.43 gallons per person
- hotels – 7.1 gallons per room
- commercial office buildings – 0.64 gallons per person.

Managers can use individual fixture benchmarking to estimate savings through fixture upgrades. New faucet aerators should allow a maximum flow rate of 1.5 gpm at 60 psi and even lower flows at lower line pressure. Urinals should be 1 gpm. Water-use-rating systems based on green building standards also provide useful aids to determine where a facility ranks compared with similar facilities.

Water use-trends also allow managers to benchmark by comparing the current period of time with past periods. The two factors that control cost are the rate for water and sewage and the volume processed. Trending the rate, which is in dollars per thousand gallons, will show increases occurring fairly steadily, not in a straight line, but generally upward as utilities pay more for pumping and treatment and, subsequently, pass increases to customers.

To offset these inevitable cost increases, facilities can reduce volume. Charting volume trends by submetering will document efforts to conserve, show successes, and show where further potential exists. The bottom line is, track and conserve because conservation affects both the rate and the volume components of cost.

These maintenance and replacement policies also can minimize water use:

- Fixing a faucet that leaks at the rate of one drip per second saves 3,000 gallons per year.
- Repairing a continuously running toilet saves 200 gallons per day.
- Replacing an old toilet with a new one bearing the Water Sense label saves 16,000 gallons per year.

The U.S. Green Building Council estimates that replacing old, pre-1994, 3.5 gallons per flush (gpf) toilets with low-flow, 1.6 gpf toilets reduces water use from 27,300 gallons per year to 12,500. The flow rate is usually marked on the valve. Technicians also can measure tank capacity. For example, a 5- by 12- by 18-inch tank contains 1,080 cubic inches. Divide this number by 231 cubic inches in a gallon, and the result is 4.7 gpf.

A single urinal uses 20,000-45,000 gallons of potable water per year, depending on age and condition. A large building or campus with 22 urinals uses 1 million gallons per year. One office building with three urinals and 120 men can use 237,000 gallons of potable water each year, assuming three uses per day and 220 working days.

On the other hand, operating cost of a waterless no-flush urinal is $1 per 1,000 uses. Payback for a retrofit to a waterless urinal is one-three years. This retrofit eliminates the need for a water-supply line, flush valves, and sensors, as well as the maintenance of these components. If managers apply these costs to purchasing retrofit urinals, the upgrade pays for itself. ■

Thomas A. Westerkamp is a maintenance and engineering management consultant and president of the work management division of Westerkamp Group LLC.


ADVOCATE CONDELL MEDICAL CENTER

Project Profile

DIAGNOSIS: Savings

Illinois hospital troubleshoots problems with boiler and chiller upgrades to ensure energy efficiency and bottom-line benefits

The chiller installations and boiler retrofits at Advocate Condell Medical Center occurred during construction of an addition to the original hospital, above, that was completed in 2011.

By Dan Hounsell, Editor

The process of installing high-efficiency HVAC equipment in institutional and commercial facilities is rarely without complications, challenges or problems. One case in point is the construction of a 174,109-square-foot addition to Advocate Condell Medical Center in Libertyville, Ill., in 2011. The project included two new high-efficiency chillers, and it incorporated the installation of two new high-efficiency boilers in the existing hospital.

Successful installations often depend on the ability of maintenance and engineering managers and their staffs to troubleshoot the problems and make the needed changes quickly.

"As far as the issues with the new building, the commissioning and the involvement of the operations staff had a lot to do with minimizing the problems we had," says Joseph Buri, the medical center's manager of energy solutions.

Expansion for patients

Advocate Condell, with 281 beds, opened in 2003. The level-one trauma, acute-care facility with 745,034 total square feet sits on a 72-acre campus and is the largest health care provider in Lake County, Ill.

One goal of the 2011 addition was patient comfort.

In addition to allowing the expansion of outpatient services, Buri says, "The other piece to it was to allow the hospital to become all single-occupancy rooms." The addition featured two 600-ton centrifugal chillers, both with variable-frequency drives, which brought additional benefits to the hospital's maintenance and engineering department.

"We chose them because they matched our current chiller plant, which were centrifugal, as well, from the same manufacturer," says Buri, who was the medical center's director of facilities and construction at the time of the project. "We were looking to maintain some equipment uniformity. That was the one piece to it. We also wanted some flexibility in operations. We were looking for efficiency to be able to take advantage of the utility rebates.

"Because we went with a high-efficiency chiller, we received some rebates on the motors. So because of the higher efficiency, we received rebates of about $48,000 from the utility."

The chillers generally performed as intended after installation.

"Everything went very well for the chillers and the new construction," Buri says, adding that the addition featured new piping, feedwater pumps, and a cooling tower. It turned out to be a very efficient operating system. (The addition) was commissioned, which also helped its efficiency."

The chillers' initial operation did present one minor complication.

"One of the things we did learn with the new chillers was that the new equipment was a little more sensitive to electrical fluctuations," Buri says. "We found them to be a little more sensitive. Basically, (the chiller) would go offline. Because of the electronics and system protection built into the new chillers, it could take 20 minutes to a half-hour for it to restart after going through its troubleshooting cycle. That was one of the things we did learn.

"It was on the utility end. If there was a storm, or if they closed switches, it would have an impact on the hospital. All of the sensitive equipment would take a hit. It affected our (new) chillers, but it didn't affect our older chillers."

The solution came in consultation with the chillers' manufacturer.

"We had the manufacturer come in and make some adjustments to reduce that cycle time," Buri says. "What we've done is narrow that down to maybe a 10-minute restart, which is a little more livable for everyone."

Troubleshooting boilers

While the chiller issues were relatively minor, the installation of high-efficiency boilers as part of the expansion project created more challenging issues.

In addition to retrofitting two new 200-horsepower (hp) natural gas firetube steam boilers in the hospital's Building A, the project was to link them with two existing 300-hp natural gas firetube steam boilers in Building B, about 150 yards away.

"We also wanted to bring the two boiler rooms together to use a common header so we could run any one of the boilers in sequence based on its load," Buri says, adding that before the retrofit project, the boiler plants were independent.

"We wanted to bring the two (boiler plants) together to provide the most flexibility and redundancy so we could operate the boilers in different configurations," he says.

While the installation of the new boilers went smoothly, their initial operation did not.

"We found that we had some feedwater issues initially once the (outside) temperature started to drop," he says. "We weren't getting enough feedwater to the new boilers, the smaller boilers. We were using one feedwater tank and a set of feedwater pumps, so (feedwater) was coming from the boiler room in Building B and being pumped over to the new boilers in Building A.

"The boilers that we were running as primary at the time — the new boilers — weren't getting enough water, and they would shut down. So we'd have to go back to the older boilers, which was not a big problem. The real problem was, why was this happening? We eventually figured out that we needed to beef up the feedwater pumps, and that solved that problem."

The retrocommissioning offers the hospital a simple payback of less than a year at a cost of $13,685, and it is projected to save nearly $15,000 annually in natural-gas consumption

More hurdles to clear

But the challenges related to the boiler retrofit were not over.

"The next problem was that when we were trying to do a warm-up of the boilers, they would never really stay in the warm-up mode," Buri says. "So when it would try to warm up, you would just put the flame on low instead of turning it up high right away. But the boiler would jump into a high-fire condition.

"We found that the boilers were shipped with some faulty sensors. Through some control work, we tried to do some workarounds and finally discovered what the issue was." The problems also extended to the plan to link the two boiler plants under a single header.

"The system never functioned the way we had intended, which was to be one cohesive unit," Buri says. "I think (the problem) was the distance and piping sizing and probably some other factors that led to it not working quite as well as we were hoping."

The difficulties in getting the boilers to operate as designed and as needed to properly heat the facilities created some discomfort among the operators.

"The operations staff was very leery about that system," he says. "They were concerned about the reliability of the system and the new boilers. As a result, they either ran the new boiler room or the old boiler room — never together. So if they needed 500 horsepower, they wouldn't run one three (hundred hp boiler) and one two (hundred hp boiler). It would just be two threes. It kind of turned into (separate) winter and summer boiler rooms."

The boilers' problems prompted Buri and his department to turn to retrocommissioning as a way to discover the source of the problems and identify potential remedies.

"We kind of stood back and looked at the whole system and tried to work with the controls contractor to develop some new sequencing," he says. "Basically, through the controls, we were able to make the system work a lot better."

The retrocommissioning offers the hospital a simple payback of less than a year, Buri says, at a cost of $13,685 and is projected to save nearly $15,000 annually in natural-gas consumption.

In addition to the boiler system, the retrocommissioning process will encompass the hospital's chilled water, steam and air handling systems. Project annual natural gas and electricity savings are $118,600, with a payback period of about four months. ■

Product Focus

Door Hardware: Spotlight on Security

By understanding new-generation key and card technology and security needs, managers can help provide better protection for facilities and occupants

By Thomas A. Westerkamp

As security and access control continue to climb on the priority lists for institutional and commercial facilities, maintenance and engineering managers are taking a closer look at the way their departments control the use of keys and cards occupants use to enter facilities. Managers are rethinking the specification of these items technicians and occupants use, as well as the process of storing, issuing, and tracking them.

By understanding both facility needs and advances in key-control and card-access systems, managers can update their strategies for matching existing technology with security needs.

Technology advances

Keyless touchpads were introduced in the 1960s to prevent lost keys and implement entry and exit recording. To gain entry, users simply entered a three- to six-digit personal identification number (PIN) on the keypad. The technology is very robust. It can last for years and withstand the weather with no maintenance required, except to clean the keypad and change the PIN code.

Next came swipe cards, called key cards, featuring a magnetic stripe, followed in the 1970s by non-contact proximity cards for enhanced flexibility and security. The cards are used with access-control card readers. Connected to an intelligent door controller, the cards store programming information from access-control software, such as the who, what, when and where of entries. They also maintain history and generate reports logged; use integrated photo ID

DOOR HARDWARE

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The silent-electrification, motorized, latch retraction option for the Rite Door® includes: motor-driven latch retraction; near-silent operation; an ultra-low current draw; preload release capability; and combined electric latch retraction and electric dogging. The door features pre-installed hardware, meets fire codes, and is easy to install. The unit requires less power to operate, which allows for lighter-gauge wiring and a reduced-amperage power supply. A range of colors and options are available to blend with existing applications. **Free Info: Circle 200**

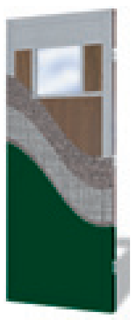
MASTER LOCK

Door hardware

The Grade 2 commercial door hardware includes a range of key-in-knob keyways from Schlage, Yale, and others, plus 16 small-format interchangeable core choices. All of the company's door hardware is available with Edge™ key control. The hardware can match most existing key systems when the time comes to expand, replace, or retrofit door locks. The door levers have a clutch feature that resists pry attacks and removable through-bolts. Deadbolts come with a heavy die-cast, anti-pry collar and heavy-duty tie screws. (not pictured) **Free Info: Circle 202**

OVERLY DOOR CO.

Pharmaceutical-duty door



The Tiger FRP series is seamless and manufactured with all non-organic materials and contains a non-porous surface. Its core consists of a 4-millimeter cell, polypropylene honeycomb surrounded by a rigid tubular FRP subframe. The skins for the door begin with the application of an in-mold 25-30-mil gel coat. A chopped-strand glass fiber mat then is applied to form the connective tissue, followed by a muscular bi-axial glass fiber that strengthens the door skins. The composite skins are simultaneously fused onto both faces and all edges of the door, forming a bond that fully integrates the components. Each unit is finished with a formulated multi-component polyurethane industrial chemical coating. **Free Info: Circle 204**

SELECT PRODUCTS LTD.

Continuous hinge

The Select SL57 is a full-surface, geared hinge that is designed to last more than 60 years on high-traffic doors. They are proven to be 10 times beyond the Grade 1 cycle count, according to independent testing through more than 25 million cycles. The Pair-Matched™ hinge includes: lifetime lubrication, anodizing after-machining, and a never-ending warranty. The life-cycle expectancy and recycled content also helps meet LEED requirements. **Free Info: Circle 201**

VIDEX INC.

Key cabinet

The CyberKey Vault 20 FX is designed to manage, program and dispense smart keys. The keys are stored unprogrammed and

locked securely in the cabinet until a radio frequency identification device and/or personal identification number is presented. After reading the card and accepting it, the key is programmed with the individual's permission. Keys are programmed with access privileges, detailing the electronic locks they can open and when. An audit record of events is stored in both the locks and keys. An identification system prevents duplication. Although two keys can be programmed alike, each one leaves its own unique record within the system. **Free Info: Circle 203**

YALE LOCKS & HARDWARE

Door closers

The cast-iron construction of the 5800 series makes it an appealing option for high-frequency applications. It is adjustable from size 1-6 and adaptable to a range of institutional and commercial applications. The unit also can be used to retrofit existing applications, as it matches a mounting-hole pattern that is prevalent in the field. Added features include: adjustments for backcheck; closing speed; latch speed; rack and pinion operation; and arm options. The series also offers a full plastic cover and spring power adjustment. **Free Info: Circle 205**

badging; and support digital-video and phone entry.

Whether wired or wireless, Grade 1 locks can withstand 180,000 cycles. The wireless version of these locks is a good way to expand security at all entries, one entry at a time, or only at remote doors. They combine with keypads to open with either a keypad or cards or both, and they can be programmed with 3,000 entry codes. Each code can be programmed to allow entry of one person, at only certain times, with 16 different schedules and certain doors.

The autologging of entries tracks activity by user and time up to the 30,000 most recent events, and they prevent problems with stolen or lost keys. The user does not know the combination, which is easily changeable or cancellable. They are battery-operated and unaffected by power outages, and they can be disabled one at a time or simultaneously in an emergency. The locks are preconfigured for the left hand but are changeable in the field.

Key override is another often-desirable feature. It can be key-in-lever, key-in-knob, with small-format interchangeable cores or large-format removable cores. There is capacity for 32 holiday-vacation exclusion periods. Locks can be preprogrammed to lock a certain period of time after opening. They comply with Americans with Disabilities Act accessibility guidelines, have a three-hour fire rating, and are certified ANSI/BHMA 156.2 Grade 1. They also have a three-year warranty, with a built-in warranty counter in the lock memory to simplify record keeping, and they can support multiple authority levels.

Needs and strategies

Analyzing facility security needs related to door hardware is a five-step process, according to security experts. They include:

- Define assets to be protected, including people, contents and the facility itself. Managers can use this information later to evaluate the risk severity and countermeasures needed.
- Assess potential threats using past incidents, loss records, safety records, insurance-adjuster experience, legal judgments, and crime rates for the nation versus the area. Categorize threats as probable, possible, or unlikely, and by severity as catastrophic, moderate, or of little consequence.
- Determine the facility's vulnerability level. Management should construct a breach of security event step by step and estimate the time required for each step.
- Select security measures. The options are a combination of electronic and physical barriers, personnel, and policies and procedures. The policy is the philosophy that management wants to employ, e.g. effective deterrence, and procedures are the steps required to implement the policy.
- Implement the program by transforming the above recommendations into specifications for people, systems and policies and procedures.

The foundation for an effective security system is deterrence, and time is the greatest friend of deterrence. Managers should evaluate every security measure by answering the question, "How does this measure increase the degree of difficulty and time it will take a motivated intruder to breach it?"

A bump key takes seconds, so a countermeasure that slows this process, such as a bump-deterring lock mechanism, is the solution. Lock bumping can be defeated with modified BHMA/ANSI 156 standards series mechanism that combines warnings, high-security, restricted keyways, and side-locking bars that eliminates the pin and tumbler. A latch that can be opened by sliding a card along the door edge or a door smashed from the frame with a ram or foot, can be replaced with more tamper-proof and reinforced jambs and hardware to defeat these attempts. Examples include a 1-inch deadbolt extension and longer screws and an extended striker plate. A warehouse door that can be rammed with a vehicle to gain entrance can be blocked with a loading dock or guarded with concrete bolsters thwart such an event.

Security in large organizations must make sure the cardholder is the person to whom the card was issued. A biometric reader and card combination fill this need. The picture-identification magnetic swipe or proximity card contains all the identification data, including fingerprints.

Next to the card reader at the entry point is a fingerprint reader. The user places all five fingers flat on the reader and the card and fingerprints must match in order to authorize entry. ■

Thomas A. Westerkamp is a maintenance and engineering management consultant and president of the work management division of Westerkamp Group LLC.

Prepared by: CENTER FOR ENVIRONMENTAL INNOVATION IN ROOFING

ROOFING

Success with Rooftop Photovoltaics Starts Long Before Installation

Early attention to design, installation and maintenance needs can help managers ensure long-term benefits

By James R. Kirby

As institutional and commercial facilities seek alternative sources of energy in the face of rising utility costs, maintenance and engineering managers in these facilities are seeing an increase in the number of photovoltaic (PV) systems installed on rooftops. One often-overlooked issue facing managers relates to the post-installation inspection and maintenance requirements for roofing systems and rooftop PV arrays to ensure both components deliver long-term performance and energy efficiency.

During the design and installation phase for the PV system, many discussions take place related to return on investment and payback. Of course, these long-term, monetary projections include some difficult assumptions. One big assumption is a long service life for the rooftop PV system.

The PV system's longevity and success implies a long-term successful roof system underneath it. But with the installation of a rooftop PV system, the roofing system becomes more than just a roof. It becomes a permanent platform for the continuous operation, service and maintenance of the PV system that still requires its own ongoing maintenance and repair.

Managers must consider a number of issues in order to ensure the long-term success of a rooftop PV system. Proper design, quality materials, skillful installation and regular maintenance are four key components to a successful rooftop PV system installation.

The manager's overall goal is to make sure that the rooftop PV system will do more than just survive after installation. The system also should deliver energy-efficiency benefits and help ensure continuous building operations.

Proper design

The first step in the successful installation of a rooftop PV system is to ensure the underlying roofing system is compatible with the intended PV system or that it can be upgraded for use with a PV system. For a rooftop PV system, the process of integrated design — having all parties involved with a project, including maintenance and engineering, at the design table — requires knowledge of both the roofing and PV industries.

Having the right people at the design table helps to create a proper path from design to installation to maintenance. To ensure a successful design, managers need to:

- make sure the roofing system will provide at least 20 additional years of useful service
- specify a cover board as a substrate for the roofing membrane in order to prevent damage and to protect the energy-efficiency properties of the roof insulation
- match the roof membrane's thickness and proven performance to the required service life of the PV system
- use construction details that are well established and meet the manufacturer's requirements
- elevate framing and conduits above the roof surface to promote drainage, which considerably reduces the potential for leaks
- design penetrations with round framing so flashing installations are more effectively and efficiently installed
- install sacrificial membranes or walkways at critical traffic locations
- provide additional membrane layers or coatings at flashings to increase durability
- engage qualified professionals during the design and planning phase to ensure compliance with all building codes and safety regulations
- make sure the rooftop PV system installation does not compromise the roofing system's warranty
- make sure that the roofing system's manufacturer has accepted all PV system details — especially attachments and penetrations — if not during the design stage, at least prior to starting the PV installation on the rooftop.

The manager's overall goal is to make sure the rooftop PV system will do more than just survive. It also should help ensure continuous building operations.

So in areas of high rainfall or snow, increase the flashing heights and roof-drainage provisions. In hail zones, select only tested hail-resistant PV and roofing assemblies, and increase the roof membrane's thickness and install cover boards to minimize hail damage. In high-wind zones, select only tested high-wind-uplift PV and roofing assemblies, add sacrificial membrane layers and install coverboards to minimize damage from wind-blown debris.

Initial design can greatly influence what happens at the end of the roof's service life. Including design elements for roof replacement that do not interrupt operation pays dividends in the future. After installation, make sure technicians can access and service the PV array efficiently.

Also, will the PV array need to be relocated during reroofing? What cost will that add? Are there a large amount of penetration flashings included in the reroofing? What cost will those add?

Quality materials

When it comes to ensuring compatibility between a rooftop PV system and a facility's existing roofing system, there is no substitute for quality materials. The roof system's durability and performance are directly related to high-quality materials. Roofing manufacturers have specific requirements for their system materials used in conjunction with rooftop PV systems.

To promote longevity, they often require thicker membranes, coverboards, and multiple layers of insulation. To accommodate the effects of heat build-up and reflected ultraviolet frequently associated with certain PV systems, installing a sacrificial membrane layer directly beneath the PV system can reduce heat build-up on the primary waterproofing membrane. Installing an additional membrane or coating at exposed vertical flash-

ings also can reduce UV exposure in critical locations.

Skillful installation

Ensuring an effective match between a roofing system contractor and a rooftop PV system contractor is critical for managers when contemplating the installation of a PV system. To help achieve the intended service life of the roof and weatherproofing, manufacturer-authorized installers need to have the skills to both understand and construct the appropriate details needed to integrate a PV system into an existing roofing system.

The remaining service life of the existing roofing system should meet or exceed the service life of the PV system. The professional roofing contractor should be involved whenever work is performed on or integrated into a roof system.

Focus on maintenance

The final key component to a long-term successful roof system is maintenance and repair during the roof's lifetime. Unfortunately, too many organizations fail to pay proper attention to comprehensive inspection and repair of the roof system, whether the work is done by in-house personnel or contractors. Even simple, inexpensive maintenance can go a long way.

To ensure success using a contractor, managers can initiate a long-term maintenance program with qualified roofing professionals and maintain communications with the system's manufacturer and contractor. Ensuring the roofing system is well-maintained helps ensure continuous operation of the building. To a great extent, it also stops potential leaks before they start.

Maintenance includes anticipating and planning for the high levels of service traffic and other impacts associated with rooftop PV installations. To protect against the effects of increased maintenance traffic, managers can install protective walkways, increase membrane thickness, add coverboards, and establish operational controls, such as restricting roof access and maintaining a log of such access.

Establishing a formal, periodic inspection program can help verify the condition of the membrane, flashings, and other critical roof-system details. In project specifications, managers might want to outline a formal maintenance program, specified for a minimum number of years, to ensure the proper maintenance of the PV and roof systems. This strategy has proven successful because it ensures consistency and accountability for both installation and maintenance. Managers also need to remember that nothing lasts forever. As a result, they must anticipate and plan for the eventual replacement of both the rooftop PV system and the roofing system.

Establishing a proactive, organized approach to roof maintenance can ensure that the proper initial design of a rooftop PV system, the use of quality materials, and the system's skillful installation will result in the long-term, successful performance of the PV system. ■

James R. Kirby, AIA, is vice president of sustainability for the Center for Environmental Innovation in Roofing (CEIR), www.roofingcenter.org.

SPOTLIGHT: CEIR

The Center for Environmental Innovation in Roofing (CEIR) is a non-profit organization whose mission is to increase the development and use of environmentally responsible, high-performance roof systems and technologies. Headquartered in Washington, D.C., CEIR serves as a forum to draw together the entire roofing industry to the common cause of raising public awareness of the strategic value of roofs in reducing energy consumption, mitigating environmental impact, and enhancing the quality of buildings.

The center produces research and information products designed to help guide members' business decisions, improve the roofing industry's policy and regulatory environment, and educate consumers on the array of environmentally responsible roofing options available.

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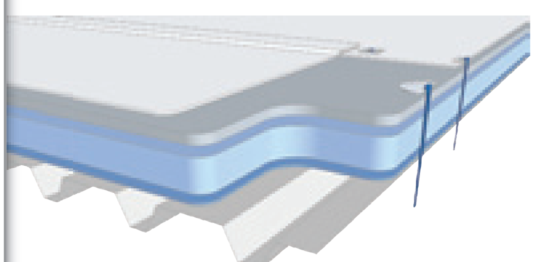

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FREE INFO: Circle 451

Lighting Retrofits: Lessons for Success

A Texas school district targets gymnasiums and cafeterias and watches the bottom-line benefits roll in

By Dan Hounsell, Editor

Al Gallardo needed results. And fast. Gallardo, who had just taken over the job of energy manager with Ysleta Independent School District in El Paso, Texas, wanted to reduce the district's utility costs quickly, and he knew just where to start to achieve quick paybacks.

"I knew I had to target the HVAC and lighting systems, and I knew that what I could do on HVAC quickly was minimal," Gallardo says. What Gallardo did to achieve his goal was plan a series of lighting retrofits in many of the district's 65 schools. The district's results have been impressive, and Gallardo's planning and specification processes can provide a framework for similar projects.

Setting priorities

The district began the lighting retrofits in 2009 after a decision to develop its own in-house energy management plan. The schools' existing lighting systems were functional, but the light quality was unsatisfactory in many areas. Gallardo also was seeking greater energy efficiency.

"That was the technology that was available back then," Gallardo says. "But that's why all these other campuses became a priority. They had all these T12s still left."

The retrofits often targeted gyms and cafeterias because of the poor and inconsistent lighting in those areas.

"They tend to put these huge 400-watt metal halide fixtures and these big bulbs" in the combination cafeteria-gymnasiums, he says. "You walk in there two years after they're installed, and you see 18 foot-candles on the floor, which is really, really poor."

Gallardo's observations during walk-through audits led him to determine that every campus needed at least one gym or cafeteria upgraded with new T5 lighting. Also, campuses with T12 lamps throughout were upgraded to T8 lamps.

"To maximize the potential savings of a lighting retrofit, it was important to not simply perform a one-to-one fixture replacement and reduce the wattage," he says. "I completely redesigned gym fixtures to maximize foot-candles at the gym floor, and I redesigned the lighting over the bleachers to reduce the light levels to an appropriate lighting level. Light levels were also adjusted to reflect the level of competitive play."

Improving light levels in classrooms also was important.

"We went with a brighter color," he says. "My concern was that, if we drop the wattage too much, what is the performance going to be? Especially since we're coupling with that superefficient ballast with (an) 0.77 (ballast factor). So I wanted to see if we could compensate with the color."

The retrofits

The lighting retrofits in the district's schools used new-generation technology to bring greater energy efficiency and higher-quality lighting.

"A typical gym or cafeteria retrofit would entail replacing 400-watt metal halide fixtures — 440 watts with ballast — with six-lamp or four-lamp T5 fixtures," Gallardo says. "Not only would wattages be reduced, but the number of fixtures would typically be cut in half. On a school classroom or office retrofit with a two-lamp T12 fixture, the lamps would be replaced with two T8, 25-watt lamps at 5,000 Kelvin and a ballast rated at a 0.77."

Gallardo's product decisions for the lighting retrofits were driven by advances in the technology at the time.

"At the time of the first retrofit, 28-watt T8 lamps were the energy-efficient standard, and (a manufacturer) had just introduced the 25-watt lamp," he says. He gathered enough samples of the lamps to retrofit one classroom at Edgemere Elementary School, and he liked the results.

When possible, Gallardo used in-house maintenance personnel to perform the retrofits, but because of their schedules, workloads and time constraints, contractors performed most of the retrofits.

"A lot of it was the access, the timing, the workload they have," he says. "I was waiting around for them an awful long time, so I had to do that. The good thing about it is that you can bring (contractors) in at night or on weekends."

The bottom line and beyond

Gallardo estimates the district has spent about $847,000 over the past three years including labor, on the retrofits. In return, the projects have generated total savings of about $1.7 million, which includes incentives totaling more than $217,000 received from El Paso Electric.

Given the retrofits' success, it is not surprising the district will continue with them.

"Even though we are almost completely done eliminating the T12 fixtures in the district, we plan to continue lighting retrofits," Gallardo says. "Next year, we will also be concentrating on outdoor lighting retrofits and replacements."

While the bottom-line benefits have been appealing, Gallardo stresses that an essential component of retrofits is the improvement in lighting quality.

"We've retrofitted a gym where referees have refused to work a game because of the poor quality of the existing lights," he says. "In another case, (a retrofit took place) where the local cable company complained that the lighting was so poor they couldn't broadcast a clean picture. In classrooms, teachers notice the brighter lighting right away, and they thank us." ■

product pipeline







A ARIENS CO.

Snow thrower

The Hydro Pro Sno-Thro features the company's first hydrostatic transmission in a snow thrower, allowing for variable-speed selection and maintenance-free operation. It features four drive models, including the Hydro Pro 28, 32, and 36 and the Hydro Pro Track 36. Speeds range from 2.2 miles per hour (mph) on track-drive models to 2.7 mph on wheel-drive models. The unit is cold-start capable and has a 50-foot discharge. An automatic traction control optimizes maneuverability. Other features include: commercial cast-iron gear cases with alloy steel gears; L-3 synthetic severe-duty gear oil; and a five-year warranty. **Free Info: Circle 150**

B GENERAL PIPE CLEANERS

Inspection tool

The compact, handheld Gen-Eye Micro-Scope carries up to 100 feet of micro-pushrod with a color camera, giving users the ability to inspect 1½- to 3-inch drain lines and many toilet traps. A 39-inch probe rod allows inspection in hard-to-reach places and has three attachments to improve viewing angles and retrieve objects. It features a 3.5-inch LCD screen, and a built-in standard definition card reader with a one-touch record button to record photos or videos. It also includes: a digital zoom; rotatable picture; voice-over recording capability; LED brightness control; and a USB port. A rechargeable battery powers the unit up to four hours. **Free Info: Circle 152**

C RIDGID

Instrument tubing bender

The 600 series model is capable of bending tubes 3/16 to ½ inch in diameter, with bend radiuses ranging from 5/8 inch to 38 millimeters. A two-stage handle system allows bends of 90-180 degrees without crossing handles. Features include: visible gain marks to ensure properly aligned bending angles; extra-long handles for increased leverage; a vise-clamp block for extra stability; cushioned handle grips for improved bending ease; and roll dies in the bending carriage to reduce tube flattening. **Free Info: Circle 154**

D LYON WORKSPACE PRODUCTS

Safety cabinet

The cabinet is available with manual or self-closing doors. The steel parts are manufactured from cold-rolled steel. A flush-mounted paddle handle design allows for fingertip operation and features a double-key set that can be padlocked. The walls are fully welded with 18-gauge, double-wall construction and 1½ inches of insulating air space. A closing mechanism uses a three-point, stainless steel, bullet-latching system. The self-closing model's latch holds the door open when in use and releases to close the door automatically when temperatures reach 165 degrees. The product meets NFPA Code 30 standards. **Free Info: Circle 156**

E COOPER LIGHTING

LED floodlight

The Lumark Crosstour™ line converts LED wall pack luminaires to floodlights. Design features include: a universal back box that adapts to standard junction boxes without additional hardware or loose plates; an interface door hinge; and a single-point captive door screw. The floodlight kit allows wall- and ground-mounted installation. The unit is LM-79 and LM-80 compliant, and it is accredited by the DesignLights™ consortium and LightingFacts®. The series is available in 10-, 20-, and 30-watt systems in small and large housing configurations with a choice of 5,000K or neutral warm 3,500K correlated color temperature. **Free Info: Circle 151**

F MAXLITE

Retrofit lamp

The LED BayMax high-low model is designed for quicker conversions to LED technology in existing, mogul-base, high-intensity discharge (HID) and incandescent lighting fixtures. The 43-watt lamp allows for updating from a 100-watt HID light source to an LED light source. The lamp's oscillating diaphragm accelerates the transfer of heat away from the LEDs. The lamp is constructed with polycarbonate optics and a die-cast magnesium alloy heat sink that enables cool operation with very low weight. Proprietary binned LED chips provide uniform color consistency with an 80-degree beam spread. **Free Info: Circle 153**

G MITSUBISHI ELECTRIC

Variable-refrigerant-flow unit

The S-Series PUMY-P60 model is a 5-ton, single-phase variable refrigerant flow zoning system that can operate at as low as 22 percent of total system capacity for maximum energy efficiency. Features include: operational ability down to minus-4 degrees; extended line length to 492 feet; improved efficiency at 16.7 season energy efficiency ratio (SEER); the ability to connect with 12 indoor units; and compatibility with all Mitsubishi Electric indoor unit styles. The series uses inverter-driven compressor technology, as well as control options offered by the City Multi® Controls Network. **Free Info: Circle 155**

ROOFING

FIRESTONE BUILDING PRODUCTS

Vegetative roof system

SkyScape™ serves as an insulating layer to help reduce building heating and cooling costs, and it protects the roofing material from ultraviolet and heat-stress degradation while mitigating wind uplift. The system extends the service life of the underlying roof system and improves storm-water management while enhancing air quality resulting from the conversion of carbon dioxide to oxygen and decreased ambient air temperature. The system qualifies for up to a 30-year Red Shield™ warranty and contributes to LEED certification. **Free Info: Circle 157**

CARLISLE SYNTEC SYSTEMS

Bonding adhesive

The Sure-Flex low-VOC bonding adhesive is fully adhered for polyvinyl chloride installations. It features wind-uplift ratings to FM 1-225. The product offers decreased flashing time and higher strength, allowing for quicker bonding, both of which increase installation productivity without compromising the roof system's performance. It can be used in any application where the standard bonding adhesive was previously used. **Free Info: Circle 158**

SEAMAN CORP.

Pipe flashing

FiberTite Wrapid Flash™ is injection-molded and faster and easier to install than traditional field-fabricated pipe flashing and produces stronger, better-looking seals around rooftop conduits and pipes. It offers better protection to any exterior penetration. By using one piece of flashing rather than two, the injected molding eliminates faulty fabricated seams. Its design eliminates guesswork by providing integrated measurements and cut guidelines for quick, more accurate trimming. **Free Info: Circle 159**

THE GARLAND CO. INC.

Primer coating

White-Night® metal primer is resistant to mild industrial fumes and light chemical conditions on aging industrial roofs in need of restoration. It is designed for application to stainless steel, galvanized metals Galvalume®-coated metals, copper aluminum, and Kynar®-coated metal roof systems. It is an all-purpose aromatic urethane with non-lifting properties that makes it effective on urethane topcoats. **Free Info: Circle 160**

For more information on roofing, see article on page 16

AD INDEX

It's easy to get the product information you want

Use the product information cards between pages 18-19. Circle numbers on the cards corresponding to the products on which you want information. Mail the card or fax it to (888) 847-6035.

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