

BOC Bulletin

A Newsletter for BOC Graduates, Enrollees and their Employers



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WINTER/SPRING 2011

BOC Instructors: Views of the Program

The BOC program is fast approaching a landmark two decades of offering the training to facilities personnel, initially in the Pacific Northwest and now in 24 states across the country. While students and their successes are regularly profiled in the BOC Bulletin, the instructors' voices are rarely heard.

Looking at resumes of the numerous BOC instructors across the country, a pattern of both strong teaching experience and applicable industry credentials and depth of knowledge is apparent. There are minimum qualifications established to apply to be a BOC instructor, but so many of the BOC instructors have experience and knowledge well beyond those qualifications.

In discussing their views of the program, patterns again emerge. Why do they continue teaching BOC? What do they think of the curriculum and the training format? For longer-term instructors, what changes have they seen? What challenges do they find in teaching BOC? Here are a few views.

Bob Rogers



A mechanical engineer at the Lake County Resources Initiative in Lakeview, Oregon and professor at Oregon Institute of Technology, Bob Rogers has been with the BOC program since the mid-90s. He views the training as an opportunity to bring a professionalism to the industry where there are so few opportunities for training.



A BOC Level I series class in Owatonna, Minnesota, one of hundreds taught across the country each year.

"This work is a passion for me. I had no direction when I got out of high school and happened to meet a facilities engineer. He told me that an FE 'fixes anything that moves.'" In general, people attracted to the work then were handy, mechanically-oriented workers with an aptitude of how to "fix what moved." Training was more informal, from old-hand to new-hand. "I think the NEEC people had such vision to start this kind of program as early as 1992. The development of the program has kept up well with new challenges in the industry."

He notes that the problems really did not exist before because energy efficiency was not a concern and buildings just ran – no focus on how. "But it's such a human-needs based industry, focusing on the environments of hospitals, schools, workplaces. Who but building operators are in a better position to affect change?"

And his students? "It's great. Assignments are always above and beyond the call. I ask

for a line-drawing and they come back with a color-coded composition! Professionalism is key to how this industry is changing."

David Pearson

A consultant at IEFM Consulting Engineers in Coal Valley, Illinois, David Pearson has thirty years experience in selection and design of mechanical, electrical and energy conservation systems and has been a BOC instructor since 2005. As a designer of systems, he believes it is a good idea to get feedback from people still in the trenches of build-

ing operations. "It allows me to be a better designer of systems. Sometimes we do things that might look great on paper but won't work in the field." A lot of seemingly great technologies can have unanticipated drawbacks, such as low-flow toilets which can, in some cases, cause pipes to plug.

He notices too that the assignments and exercises can give students a better idea of the original design intent for their facilities, which can allow for more efficient "tweaking" of the buildings. "It's a good mix between the workbooks and the class exercises and assignments because the students can relate concepts to their own buildings."

He notes that, "As energy codes become more demanding, it's tough to keep it simple." In addition to keeping students up on codes, technologies and the most efficient and cost-effective ways to incorporate them, Pearson says that, added to class training, the networking aspect of the series is a huge benefit to draw on for the exchange of information from those in similar facilities or from the instructors themselves.

Reg Pecen



A professor of electrical engineering technology at the University of Northern Iowa (UNI), Reg Pecen has been a BOC instructor for over five years. Like

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David Pearson, he says he learns a lot from his students who are in the "real versus theoretical" world. That said, he also recognizes the benefits of theory in illustrating a point. "The simplest ideas make incredible differences. For example: Incandescent versus LED exit signs that operate 24/7. That is over 8,700 hours a year and there are millions of exit signs in this country. This adds up and the math can illustrate that."

Incandescent exit signs typically contain two 15 or 20W bulbs (e.g., 15T6 and 20T6.5 lamps) that draw 30-40W in total, whereas LED exit signs can consume less than 1W but no more than 10W. Since exit signs are lit year-round, 24 hours per day, each LED exit sign retrofit can save about 300 kWh, preventing the release of half a ton of CO2 emissions annually (US EPA, ENERGY STAR, undated). Replacing incandescent-lit exit signs with new LED signs or retrofitting existing signs to use LED lamps is one of the easiest and most cost effective energy efficiency retrofits available to public, industrial, and commercial facilities.

Pecen, too, believes the networking aspect is a real benefit. "I love to interact with BOC students and see them as professionals who have great experience in running their facilities. I listen to their experiences and share this valuable knowledge with my students at the university. At the same time I try to bring up-to-date, innovative technologies strengthened with basic electrical theory to the BOC classroom to make sure everyone is aware of the latest technologies available for industrial and commercial facilities." He also enjoys bringing desktop lab trainers to the BOC classroom and having small teams working hands-on with basic electrical subjects that include wiring, measurement and testing. He was happy to see the crossover from theory to practical application and "was thrilled to see and talk to a few of our engineering technology alumni from UNI taking the BOC classes after many years of experience."

He also believes that, "One of the biggest roadblocks of achieving nationwide energy efficiency is the lack of knowledge surrounding how much facilities would save from efficient operations. I wish each and every commercial

and industrial plant, technical as well as managerial staff, would participate in BOC."

Dean Laube

An energy consultant for Franklin Energy Services in Eau Claire, Wisconsin, Dean Laube has been teaching with BOC for over five years. To him, a valuable aspect of the program is that, "a lot of the participants are facilities personnel who haven't really been in a classroom setting since high school. They are often the people who have to "fix stuff" but never really get much credit for it and also never get the training that actually gives them a certification recognizing what they can and do for O&M. BOC fills this niche."

"One of the biggest roadblocks of achieving nationwide energy efficiency is the lack of knowledge surrounding how much facilities would save from efficient operations. I wish each and every commercial and industrial plant, technical as well as managerial staff, would participate in BOC."

- Reg Pecen

Laube believes that an advantage of the BOC training is that the homework assignments and class exercises revolve around the students' particular facilities so that completing them is also a part of their jobs. The classroom becomes less intimidating with a format like this.

Laube, too, agrees with other instructors that the networking aspect is beneficial. "The best classes I've had are when I have a hard time getting people back in the room after break. They're busy comparing notes on problems and possible solutions." Students are also comfortable contacting him well after the series has ended for updates and information.

A conviction that awareness is key because it provides a knowledge base, Laube believes

that the training shouldn't just be for building operators. "I'd like to see the course reach out to vendors and engineers so that it would broaden their understanding of what O&M people do on a daily basis. A knowledgeable service contractor could set themselves apart from the competition."

Laube would also like an exchange of ideas to extend to the BOC web site where a blog would be a discussion forum for problems and solutions that grads and instructors alike could access. (An exciting aside: This is in the works.)

Greg Jourdan

Director and Professor for the Refrigeration Technology Program at Wenatchee Valley College in Wenatchee, Washington, Greg

Jourdan has been with the BOC program since it started in the early nineties and has been teaching at the college level for three decades. "I love teaching and want to share my experience with students."

His favorite classes are when he and his students are able to tour the facility where the class is being held – boiler and compressor rooms, mechanical rooms with large air handlers, HVAC rooftop units. "I have seen students' eyes light up when we show them equipment they have never seen or when they realize that the classroom material can transfer to the real world with only simple clarification."

Jourdan says it's very fulfilling to hear from former students who tell him how much they learned in the class and how applicable the information had been for them to save money for their companies, schools or other facilities. "Helping them do a better job at their workplace helps me to realize that my efforts are worth the time. Helping them succeed in their careers as HVAC technicians or as building operators is truly priceless."

Dale Garcia

A 36-year employee at Portland General Electric, Project/Program Manager and former professor at Portland Community College, Dale Garcia has spent a couple of decades teaching and training in the electrical field, specializing in high and medium voltage systems and has been with the BOC almost from the beginning.

"I've taught hundreds of students over the years and most come in with a great attitude. Initially, their interest isn't so much energy efficiency as in understanding the industry and building management," says Garcia. He notes that things have changed over the years in facilities management in that people tend to be more proactive in looking for new solutions rather than relying on "retro" ones.

Garcia believes that NEEC "has done a great job keeping the information fresh. BOC is right in the mix of what is current in the industry." Teleconferences are held at least quarterly with NEEC and BOC instructors and Garcia says that the instructors are very ready to offer opinions about curriculum and suggested class refinements. "NEEC listens and has always been very responsive."

Networking also works in favor of the program, he believes. "The credibility of the training

(Continued on page 7) See BOC Instructors.

Massachusetts Courts Lead the Way to Energy Efficiency

State budgets across the country have taken their hits in the current economic climate and thus governments have taken steps to rein in spending. As BOC people know, one of the best ways to accomplish this is with energy efficiency measures. In 2007, Massachusetts created a program called Leading by Example (LBE) where the goal was to reduce energy use by 20% by 2012 and 35% by 2020 at all state-owned facilities, a doable but aggressive timetable. Leased facilities, too, are included where the state pays energy costs.

One of the most successful turnarounds has been in the state's trial court buildings, which number 62 facilities throughout Massachusetts. For these buildings, in FY 2008/2009, energy savings were \$2.9 million. The next fiscal year saw savings of \$2.5 million. And then just this past October, the first Energy Star® label was awarded to the Plymouth Trial Court. And there will be more to come.

Cooperation and Communication

Ron DePesa is a BOC levels I & II graduate who was first introduced to the program by electric and gas utility NSTAR about five years ago when working for the Norwell School System. He is now operations & maintenance supervisor for the state's Court Facilities Bureau (CFB) and has been an integral part of the move toward energy efficiency in the court building system. The trials courts have also been very supportive of their staff and have provided BOC training for a number of building operators. BOC instructor Alan Mulak says that BOC classes consistently have new students coming for the training.

DePesa believes that there are a number of reasons the effort has been so successful, but that chief among them have been buy-in to the idea, inter-agency communication, and strong interest at the administrative level. "Support has to come from the top down," says DePesa. "Chief Justice (for Administration and Management) Robert A. Mulligan is a very



Plymouth Trial Courthouse, Plymouth, MA.

practical person who wants to see results, but also has an interest in seeing how things are actually done. Steve Carroll, the director of CFB, has allowed us the freedom along with his support to get thing done."

When the push to improve energy efficiency started in 2007 with the Leading by Example program, evaluations had been performed and work started at the various court sites. About two year ago, a Green Team was established to facilitate communications. Since several agencies were involved in green-lighting and funding programs, it was useful to have people from different departments come together so that everyone was on the same page. Now the O&M people pinpoint the problems, suggest solutions and projects are prioritized for eventual implementation.



Chief Justice Robert Mulligan and Ron DePesa installing the EnergyStar® plaque for the Plymouth Courthouse.

"Paul Antoniewicz is our resident engineer and an energy manager within the system. He acts as a liaison between the courts' O&M people and DCAM (Division of Capital Asset Management) to determine what can get done," says DePesa.

DCAM also funds two BOC course series annually for the State

of Massachusetts building engineers, in which DePesa and two of his colleagues participated: DePesa in Level II and in Level I, Mark Ronan and Rob Decourcey.

There have been many positive changes over the last few years. In the past, CFB people never really looked at the bills with the idea of how energy efficiency measures could translate into savings. And the state just paid

the bills. DePesa recalls, "When I first called the accounting department for copies of utility bills, they said it was the first time anyone had ever asked." By tracking the information and performing building walk-throughs, especially after occupied times, CFB staff throughout the system began to get an idea of where the major problems were.

All the courthouses will eventually be under remote electronic monitoring (there are about a dozen or more so far) and anomalies can be readily noted and the causes investigated and addressed.


A key difference in the working environment now is that everyone that wants to has input and a better awareness of the big picture. This contributes to the "buy-in" concept. "It is so great to see people cooperate like this and makes my job a lot easier," notes DePesa.

So What's Ahead?

As noted above, the Plymouth Trial Courthouse is the first building in the state system to receive EnergyStar® labeling, with a building rating of 90, along with a third party verification and audit by ASHRAE. In FY 2009/2010, the building's energy costs were reduced by over \$13,000 – and this savings comes at a building designed for efficiency and completed in 2007. Savings possibilities for the older buildings should be even more dramatic. "This was particularly accomplished by the interest and efforts of fellow BOC grads Mark Ronan and Rob Decourcey, along with Dave Yalenezian," notes DePesa.

The Massachusetts Trial Court also received a 2009 LBE award for its "outstanding efforts" in its energy efficiency leadership. Continuing demand response programs, ongoing lighting retrofits, implementation of single-stream recycling across all courthouse buildings, working toward additional LEED recognition – it is all on the table and the trial court O&M staff will chip away at the projects.

At the ceremony of the installation of the Plymouth Trial Courthouse's EnergyStar® plaque (pictured), Massachusetts Senate President Theresa Murray noted that it was a "great example of how the right people in the right place with the right leadership can lead to real results."

And those real results will keep on coming. 

BOC Enhances Established Procedures in Wichita

The city of Wichita, Kansas has been working on energy efficiency in its public buildings for almost a decade now. The work is ongoing, given that the Public Works & Utilities Fleet and Facilities division is responsible for 3.6 million square feet of building space. And it is varied: the 13-story city hall, a convention center, senior and recreational centers, police and fire stations, and an art museum – to name just a few of the 42 key buildings in the municipal orbit. Located throughout the city, the operational demands of these structures were both diverse and a bit daunting.

In 2002, the city entered into a performance contract with what is now Schneider Electric to assess and improve energy usage. It was determined that they install an extensive and expandable building automation system (BAS) in Wichita's City Hall. The BAS was designed to link the city buildings so that operations in all buildings could be monitored from the city hall location 24/7, as well as remotely via a dial-up option. There was also a local override option, if needed. With this, they started real-time tracking of energy use to target areas for improvement throughout the system.

Results were very satisfying. The tracking system allowed them to measure the impacts of energy efficiency projects such as lighting retrofits at all sites and replacement of cooling towers and old motors with VFD ones. Next on tap was building scheduling – all energy-efficiency measures that would guarantee savings. And save they did: Public Works Building Supervisor James Mayer says that taking these steps has saved the city over \$300,000 annually in energy costs, with an estimated 14% reduction in energy use.

But, as facilities managers know, the work is ongoing and there are always ways to improve operations: newer technologies, changing behavior and energy-use patterns, or just updating old equipment. BAS systems are powerful tools but need to be manned and constantly interpreted to achieve full effectiveness.

A facilities professional for many years, Mayer is also the president of the local BOMA (Building Operators & Managers Association) chapter. At a chapter meeting early last year, he heard Katie Rex, the energy account



Wichita City Hall: a 350,000 sq. ft. building that is the center of city facilities monitoring.

manager from local utility Westar Energy, speak very enthusiastically about the BOC program. Mayer was delighted to think that he could provide his staff this type of training. "BOC is something that has been needed in the industry for years," said Mayer. "There was never any course or training to teach people how to actually run a building."

"BOC is something that has been needed in the industry for years. There was never any course or training to teach people how to actually run a building."

– James Mayer

He determined to send his building operators. At that time, there were six on staff who had been there anywhere from four to ten years. Mayer sent them all and all completed BOC Level I. Later, when he hired two more people, he decided to send them as well. They will complete Level I this year. "From a building management perspective, the program helped the operators get the big picture and gave them insights into the intricacies of how building systems not only work, but also how they interact."

The city's performance contract will run out in 2012. Mayer believes that the staff's experience, combined with BOC training, will allow them to bring much of the energy-use assessment work in-house. "I am really lucky to have a great staff. They are very forward-thinking and not only recognize a problem, but also look for a solution. They are coming up with great ideas."

Constantly looking for ways to save energy and keeping those ideas at hand should funding be available has worked well for Mayer and his staff. The city of Wichita received over \$3.5 million in ARRA (American Recovery & Reinvestment Act) money through the DOE's Energy Efficiency & Conservation Block Grant program by putting together some strong project proposals. Some completed and on-deck projects include: occupancy sensors for lighting control throughout the City Hall, a new Turbocor magnetic-bearing chiller for the Environmental Services building (which will use about 25% of the energy needed for the old unit), as well as boiler assessments and retrofits.

They also have plans for their own capital expense budget. Some funds will be used to replace equipment that is coming to the end of its life cycle but others are taking advantage of newer technology options such as adding TPO roofing, increasing insulation to an R-20 factor, which could increase R-value by anywhere from 25%-40% over current values. HVAC systems are under scrutiny as well. Wichita maintenance staff have already replaced dozens of 15-20 year old HVAC units, increasing SEER ratings from 7 and 8 to an amazing 17 SEER.



Wichita's 700,000 sq. ft. Century II Performing Arts & Convention Center.

The team operates now with an expanded perspective of how to manage buildings. As Mayer views it, "They are enthusiastic about achieving best practices by recognizing and challenging old ones and trying to come up with something better. They love the challenge and it makes them think outside the box." Congratulations go out to the city's BOC grads: Jack Atkins, DeVaughn Brown, Virgil Bustos, Steve Cole, John Drew and Dale Havens. Newcomers Joel Schmidt and Marcus Wair and veterans Gary Mikulecky and Wayne Nunn look forward to joining their ranks in 2011 and making a difference to the city of Wichita. **BOC**

Common Lighting Maintenance Mistakes

By John Feters

Introduction

For the past several months, Effective Lighting Solutions has performed hundreds of lighting audits. In the course of this work, many lighting maintenance mistakes were uncovered. This article highlights the most important of those found.

Lamp & Ballast Mismatch

This condition is created when maintenance personnel install T8 lamps in fixtures with older technology magnetic ballasts, designed to operate T12 lamps. T8 lamps have the same pin spacing as T12 lamps and mechanically fit in the same sockets. Normally, when T8 lamps are first installed, ballasts are changed to compatible electronic ballasts. T8 lamps operated on magnetic ballasts experience short life, due to the higher current delivered to the lamp.

Building owners and managers have expressed concern about a potential fire hazard from any overheating that may be caused by this mismatch. Although the result is overheated lamps, from all sources we contacted (GE, Philips Electronics, Universal Lighting Technologies), there is no evidence that the use of T8 lamps on T12 magnetic ballasts will cause sufficient overheating to be a fire hazard.



However, this combination is not listed on the ballast manufacturer's specifications, which means that lamp and ballast warranties are voided.

More seriously, this condition will void the Underwriters Laboratory (UL) listing of the fixture. Many insurance companies require that companies use UL listed electrical equipment in their buildings. When the UL listing is voided, the end user assumes all liability for damages and injury and insurance companies have a way out of paying fire claims, whether caused by the lighting equipment or not.

On an audit that Effective Lighting Solutions performed at a major service academy, another mismatch was found – T12 lamps on electronic ballasts designed for T8 lamps. The maintenance contractor found that their contract did not specify what lamps were to be used for replacements and was improving their bottom line by using sub-standard, imported T12 lamps.



Both of these mismatch conditions can be found using a simple audit tool – the Discriminator (model D-1 by SensorSwitch – now part of Acuity Brands – or the Advance Ballast Checker by Philips Electronics). These are hand-held, point-and-shoot instruments that discriminate between the 120 Hz flicker of the magnetic ballasts and the high-frequency flicker of an electronic ballast.

They are recommended for anyone performing lighting evaluations and audits.

Instant-Start Ballasts and Fixture Wiring

Another common mistake is made when retrofitting fluorescent fixtures from the older technology magnetic ballasts to electronic ballasts. The rapid-



start, magnetic ballasts have two wires from the ballast to each socket and the instant-start electronic ballasts have just one wire from the ballast to each socket. In many cases, this single wire is attached to only one side of the socket, causing uneven cathode heating as electrons are stripped off the cathode by the applied high voltage. Lamps that have been subject to this condition show distinctive small gray "clam-shell" markings from cathode sputtering. This mistake can be avoided at the time of retrofit by replacing the sockets with "shunted" sockets that have an internal short between the two terminals at each socket. To correct this mistake after a retrofit has been installed, install a jumper wire between the two terminals at each socket.

Electronic Ballasts and Fixture Wiring

Electronic ballasts operate fluorescent lamps at high frequency (between 20,000 and 60,000 Hz).

This high frequency current from the electronic ballast to the lamps requires a better connection at the socket than may have been provided by magnetic systems. When lamp sockets are reused for a retrofit, they must provide a tight connection to the lamp pins. When they do not "bite" into the pins,



arcing can occur, which generates heat and can loosen the connection more, until the ballast fails or the lamp falls out of the socket.

Ungrounded Fixtures

Older lighting systems with magnetic ballasts were very forgiving if there was no ground. However, electronic systems need to be grounded with a separate green wire ground and a conduit ground may not be good enough.



Fixtures should be grounded for two reasons: **1) Safety:** The National Electric Code (NEC) requires grounding to protect maintenance personnel from shocks, and **2) EMI protection:** In electronic ballasts, the capacitors of EMI (electromagnetic interference) filters need somewhere to "bleed" off their charge to ground.

Luminaire Disconnects

The NEC section 410.73(G), 2005 ed and the Canadian Electrical Code (CEC) part 1, rule 30-308(4) requires that all new and retrofit fixtures have an approved disconnect installed on the power line feeding each fixture. Although the effective date was January 1, 2008, we have found many new and retrofit fixtures without disconnects. The code requires this device to protect electricians servicing lighting circuits. Disconnects allow electricians to remove the power from the fixture they are working on without turning off the whole circuit or working the fixture hot. Some fixture manufacturers supply disconnects on the input power line of new fixtures.

Touching Halogen Lamps

What happens? Oil in human skin is deposited on the glass envelope. Fingerprints cause uneven heating on the glass surface



that creates stress cracks as the lamps are heated and cooled when turned on and off. The result is short lamp life. To avoid this problem, when replacing each lamp, use a clean white glove or the tissue paper from the package that the halogen lamp came in.

(Continued on page 7) See *Lighting Mistakes*.

BOC Grads Making a Difference

Fulfilling a Dream – Efficiently!

Sliders Café & Cowgirls Western Wear Carnation, Washington

BOC graduate **Marty Lepore** has been in building operations for over twenty years. Much of his work was in residential and office building facilities management with companies such as CB Richard Ellis in Washington state. He was even recognized as an "Energy



Sliders Café & Cowgirls Western Wear – formerly the Carnation Gas Station.

Hero" by the city of Seattle in 2001. With the economic downturn though, much of this type of space had higher vacancy rates than usual and, unfortunately, Lepore was laid off. Having difficulty finding a job in the tough employment market, he attended a class on starting your own business offered by Washington State's WorkSource program.

Lepore has also been a professional musician for over thirty years and has played with numerous Pacific Northwest area favorites. Known as drslide, in 2005, he formed the band The Slide Factor, with his partner, Phillis Ann Lee, as vocalist and songwriter. When in the town of Carnation, WA, Lepore noticed an old, unused gas station, the Carnation Station – circa 1938, and thought it would be a perfect location for his dream set-up. With BOC training and the WorkSource course under his belt, Lepore decided to use his work skills to aid in following his passion: bluegrass and Americana steel music.

He and his new landlord began renovations in 2010 and are now closing in on an opening date for Sliders Café and Cowgirls Western Wear, a restaurant, music and apparel retail center. Converting an old gas station to a restaurant is challenging and the conversion was extensive, even though the space was small at about 1,250 square feet. Lepore details some of the changes. "All windows and doors have been replaced with new double-pane windows

and solid doors. The two 10-foot roll-up doors have been replaced with insulated ones and walls and ceilings have been insulated, with R-13 insulation in the walls and R-21 in the ceilings."

Drains have been upgraded and light fixtures converted to energy-efficient CFL lamps inside and out. The conversion also includes

a 10x12-foot addition that will house utilities – water heater, central heating – and the new heating system will use natural gas. About the changes, Lepore says that, "My BOC training helps in being aware of insulation techniques and their value. Previously, the building had no insulation at all, so insuring that all door and window seals are tight with expandable foam, backer rod and caulking before casing is completed, using doors sweeps and insulated outlets all make the building energy-efficient."

Even more interesting is that, in a perfect touch, they will be continuing on the "Carnation Station" tradition with an

updated twist: The filling pump island will be converted to include an electric car charging station, mounted just to the side of the old pumps. Lepore is excited about the whole project. "What a cool conversion, taking an old gas station and turning it into a family gathering place and a symbol of growth and new business for the town of Carnation."

"My BOC training helps in being aware of insulation techniques and their value."

– Marty Lepore

Good luck with your new venture, Marty! And readers, if you're in the Carnation area, check out Sliders Café and Cowgirls Western Wear – hopefully as soon as this coming March!

Change in a Researcher's Focus

University of Santa Barbara – Santa Barbara, California



Amorette Getty

Amorette Getty does not fit the usual profile of a BOC student. A postdoctoral fellow at the University of California Santa Barbara (UCSB), Getty has a BS in physics and a PhD in materials engineering, each from UCSB. She has been working in laboratory research for most of her adult life, so why get certification training as a building operator?

"Lab research, in many cases, uses a lot of heavy-duty equipment. It occurred to me that here we were, as researchers, trying to improve efficiency in materials to improve how we run our world, and we ourselves just weren't being energy-efficient," says Getty. "It's very cultural behavior to take lab energy use for granted. New researchers learn their habits from the older ones so it was definitely an area that needed attention. With researchers, the more info we give them, the better decisions they make." So, in a sense, Getty sees her new role of laboratory energy efficiency scientist as a matter of getting the right info on people's radar.

This in mind, Getty reached out to the facilities personnel to determine the best way this could be done. The UC system has sent dozens of O&M staff to BOC training and when she started her discourse with operations personnel, they recommended the program to her. "For me, it gave an under-

"It's very cultural behavior to take lab energy use for granted. New researchers learn their habits from the older ones so it was definitely an area that needed attention. With researchers, the more info we give them, the better decisions they make."

– Amorette Getty

standing of the nitty-gritty, hands-on type of work done by facilities people. Adding that understanding to my knowledge of lab work gave me the opportunity to be a good bridge between 'theoretical' people and those on the ground. It's particularly valuable at an education institution to be taught how energy use actually matters and, in general, how HVAC systems work because in research we use a lot of clean rooms with high-powered equipment and specific water- and air-quality requirements," notes Getty.

Initially, the concentration was on no-cost/low-cost solutions, such as equipment scheduling and changing behavior patterns by educating the researchers. Then Getty, along with O&M staff, started looking at various options for replacing old, inefficient equipment, such as the ubiquitous, energy-hungry vacuum pumps used in the clean rooms. They worked with utility company Southern California Edison to find applicable rebate programs to defray costs.

So, after eight years of lab work on such materials application projects as MBE (molecular beam epitaxy) system construction, planar semiconductor processing techniques, spectroscopic ellipsometry and ill nitride material growth, Getty now finds that her focus has shifted from theoretical research to a more practical application: analyzing the use of resources and energy in laboratory environments. It is a very specific niche but the opportunities for energy savings and, eventually, laboratory sustainability are enormous. And knowing the process from both sides, as Getty certainly does, is invaluable.

There's Always Something New

The Bulletin did a piece in its summer/fall 2007 edition concerning the efforts of BOC grads **Terry Stickney** and **Shane Conrad** of World Vision in Federal Way, Washington. Their data center had grown dramatically – from four servers in 1995 to about 120 in 2007 – and was continuing on that upward path. Heat loads in the center were huge.

At that time, they put several creative options in place: establishing hot and cold aisles, fabricating special panels designed to control exhaust from servers, installing duct work to control air flow. These various changes freed up an estimated 8-10 tons of cooling, while giving about an additional 20% capacity available to the data center. But as the data center continued to grow, more adaptations were needed, such as using portable backup AC units to regain adequate redundancy.


But, of course, the data center keeps growing and presenting new challenges. Recently,



The use of 5-ton MovinCools with flex/overhead ducting provides emergency cooling in any area where it's needed.

Shane Conrad told the BOC office just what innovative adaptations they have been working on. The data center is still housed in the same 1200 sq. ft. area, but there are now over 140 servers. Despite the fact that they had 50 tons of cooling capacity and an additional 25 tons of backup cooling, the data center was continually maxing out cooling capacity and causing high-head pressure on the compressors. Says Conrad, "At an energy seminar, we learned about over-head ducting and cascading the heavier chilled air down over the servers. In the seminar, nylon ducting was used, but that was cost prohibitive for us. We decided to try using round sheet-metal ducting instead with holes sized and spaced to evenly distribute the air." It has turned out to be a solution far better than they'd hoped, dropping the temperatures 5-10 degrees for the servers at the top of the racks.

Using a thermal imager, they noticed that the blade server exhaust was being drawn back into the cold aisle. They added a door to one of the cold aisles and found that the temperature at the face of the blade server rack was lowered by 10-15 degrees. They also have additional portable coolers (5-ton MovinCools) in adjacent rooms. Says Conrad, "We installed sleeves in the separating walls, so when we need emergency cooling, we can attach flex ducting between those MovinCools and the sleeves, and then attach flex ducting to the sleeve in the data center. This will allow us to place cool air in whatever room it is needed the most without purchasing additional units."

Adaptation and flexibility are key factors in building operations. There is certainly some creative thinking going on at World Vision! 


BOC Instructors (Continued from page 2)

is high and I don't think it's given; I think it's earned." He, too, gets calls months after a series has ended, which he sees as a testament to the openness and availability of the instructors, "their real-world knowledge and the practical application of that knowledge."

Complementary Patterns

BOC instructors are enthusiastic about what they do and what they teach. This enthusiasm makes them experts in their fields, constantly looking for new ideas and technologies to share with their students and co-workers. This enthusiasm translates to the classroom and makes it felt among their students.

The field is indeed being recognized as a professional one, more so all the time as building operation becomes increasingly detailed and complex, and BOC is a means to understanding the operational complexity and acknowledging that graduates are trained professionals. Networking and the exchange of ideas, problems and resolutions is a major part of the program. And finally, those trained get results at their facilities.

As Dale Garcia concludes, "I'm very satisfied that what we're doing is fair to the students and to the program. We focus and stay on task to teach energy efficiency and people appreciate it." 


Lighting Mistakes (Continued from page 5)

Summary

This article has shown a few of the common maintenance mistakes found in lighting systems in commercial buildings. Highlighting these mistakes will help guide maintenance personnel to avoid or correct them.

About the Author

John Fetters, C.E.M., C.L.E.P., C.E.A and a BOC instructor, is a lighting consultant and owner of Effective Lighting Solutions in Columbus, OH. Mr. Fetters has numerous industry credentials and associations and has published over 150 technical articles.

To earn one continuing education hour towards your annual BOC re-certification, read this article (starts on page 5). You can then visit the BOC web site at www.theBOC.info to take a short online quiz based on the material. Upon successful completion, print your confirmation and submit it with your renewal application (due by March 31st). A passing grade equals one credit hour to your renewal record. 

Recertification Seminar in RI Attracts over 80!

In last year's Winter/Spring issue, the Cranston Public Schools (CPS) system in Rhode Island was featured for its excellent work in energy savings (totaling now over \$2.7 million since November 2006). CPS is continuing its push for energy efficiency and just this past October, hosted a BOC recertification seminar lead by BOC instructor, Alan Mulak.



Cranston West High School, one of twelve schools to receive the EnergyStar® label in the district.

BOC sponsor National Grid also sponsored the event, which featured speakers from the Northeast Energy Efficiency Partnerships (NEEP), and BOC instructors Alan Mulak and Bob Cerio. The theme for the event was "What's new since you graduated?" Numerous topics were highlighted at the session, such as emerging technologies for facilities, the latest utility-driven incentive programs, some of the invaluable software "free stuff" available for energy management, as well as a discussion on commissioning and retro-commissioning.

The whole day was a great success and welcomed more than eighty participants.

A final exciting note on Cranston Public Schools' continued energy-efficiency efforts: In last year's issue, four of the city's 31 schools had earned ENERGYSTAR® building labels status, the first schools in the state to do so. This year that number climbed to twelve! The regional EPA press release on this praised the outstanding facilities staff, their training and their dedication to work on energy efficiency projects. Particularly showcased were the efforts at Cranston West High School (pictured) which, according to CPS Energy Manager Karen Verrengia, "demonstrated outstanding performance and is a recipient of EECBG stimulus funding."

The award-winning facilities team at West (the campus includes five buildings), lead by foreman and BOC grad Joe Boutin, has several BOC graduates, including the district's Senior HVAC specialist for all 31 buildings, Paul Musco (featured in last year's winter/spring

BOC Bulletin issue). As its role as seminar host illustrates, CPS continues to be a big BOC supporter and is doing great work putting the training into practice.

Moultrie Technical College's Operations Staff is 100% BOC Level I Certified!

Georgia's BOC partner, Gwinnett Technical College, is pleased to recognize the Facilities Department of Moultrie Technical College in Moultrie, Georgia for certifying 100% of their operations staff in the BOC Level I program.

Moultrie Technical College graduates are David Evans, Steve Fletcher, Scotty Funderburk, Steve Peacock, and Todd Presley.

Prior to Moultrie Tech's involvement in the BOC program, VP of Operations and BOC graduate, David Evans, forecasted a 3% savings in electrical savings for 2010; however, with 100% of the college's operations staff implementing BOC cost savings strategies, it is anticipated that actual savings will be approximately 20%. Moultrie Tech's case study will be featured in an upcoming edition of the BOC Bulletin.



Moultrie Technical College - 100% BOC certified.

The Board of Directors of the Northwest Energy Efficiency Council (NEEC) offers a "100% BOC Certified" award to companies that certify 100 percent of their building engineering staff through the Building Operator Certification (BOC) program. Applications for this recognition can be found at the BOC web site (www.theBOC.info).

"Facility departments that certify 100 percent of their engineering staff demonstrate commitment to their profession by raising the skills and capabilities their department to address facility efficiency," says Stan Price, NEEC's Executive Director.

Congratulations to Moultrie Technical College's operations staff!

BOC in New York City Schools

The New York City K-12 school system was recently highlighted in Facilitiesnet.com's October 2010 issue for its tremendous efforts towards sustainable building practices. Use of ENERGY STAR® Portfolio Manager, a BOC training mainstay, established energy benchmarks for each of the buildings. This was a key first step in determining where the problems lie and what areas are ripest for operational improvement.

The New York City school system accommodates 1.1 million students per day in 1,263 buildings representing more than 130 million square feet of space – about 40% of all municipal building space. With so many buildings in the mix, a certain amount of triage is necessary. Data from Portfolio Manager helped in this initial triage by targeting the mid-level performers. This strategy would eliminate schools already performing at or above the energy score goal of 75, and also those with very low scores (under 25) that were likely to undergo renovation anyway.

With such a huge system, mutual understanding of common (and feasible) goals is needed, so communication between city agencies has been a crucial factor in many of the energy efficiency efforts. Because they need to be in the loops for renovations and new constructions as well, the O&M arm of the school system, the Division of School Facilities (DFS), also has to communicate with the School Construction Authority (SCF).

John Shea, CEO of the city's (DSF) and a leader in the sustainability efforts, believes training is crucial to success. "We've noticed the most significant reductions, not by capital work that we've invested in, but in training operators," notes Shea. Training requires funding and the city's Department of Citywide Administrations Services (DCAS) has responded by supplying funds for all the city's school custodians to attend BOC. It is a remarkable endorsement.

NYC schools sustainability plans incorporate more than building operators and city school building planners. Education of students and staff is another element of the efforts so that new, more considered energy habits can be observed and hopefully produce a culture change with positive ripple effects. In some schools, programs have already been developed to include showing kids how buildings work and the importance of conservation.


BOC partner NYSERDA (the New York State Energy Research & Development Authority) is also involved, funding alternative energy sources such as wind turbines and solar panels. NYSERDA is also a supporter of Building Performance Lab at the City University of New York (CUNY) which, along with DCAS, has been instrumental in ensuring that BOC training is offered to all public school custodians.

The task is daunting, but the New York City School system is chipping away project by project. Since fiscal year 2008, an estimated 11% in total energy cost has been saved, a reduction from 6.5 billion MBTUs to 5.7 billion. Read more about the exciting progress at www.facilitiesnet.com. To see a video about the new program, check out the BOC web site's (www.theBOC.info) Press & Media section.

Congratulations Ray Congdon!



BOC instructor – and graduate – Ray Congdon, formerly Director of Operations of Group Health at CB Richard Ellis in Seattle, WA, will be leaving that position to assume another with the

company at their new HP account as Senior Engineering Manager. In bidding him farewell, the announcement noted that, "His efforts on the energy front have also been impressive, resulting in significant savings for the client as well as the capture of many energy grants and rebates." Congdon will be relocating to Houston, Texas but still plans to continue to instruct in the BOC program. We wish him all the best at his new position! 

Looking for Bright Ideas to lower your energy costs?



We Bring You The Power to Succeed

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425.783.1700 (M-F, 8a-5p)

Or visit us online at www.snopud.com

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National Conferences Symposiums 2011

International Summit on Health Facility Planning, Design & Construction

Tampa Convention Center
March 13-16, 2011

More info: www.ashe.org/PDC/

National Facilities Management & Technology Conference/Expo

The Baltimore Convention Center
Baltimore, MD
March 15-17, 2011

More info: www.nfmt.com

This event also includes the Maintenance Solutions Expo, the GreenTech Conference/Expo and the Safe Building Expo.

Association of Energy Engineers (AEE) Conferences & Technology Expos

Globalcon 2011

Philadelphia, Pennsylvania
March 30-31, 2011

West Coast Energy Management Congress (EMC)

Long Beach, California
June 15-16, 2011

More info: www.aeecenter.org/shows/

International Facility Management Association (IFMA)

IFMA Facility Fusion

The Westin – Boston Waterfront
Boston, Massachusetts
March 23-25, 2011

IFMA World Workplace 2011 Conference & Expo

Phoenix, Arizona
October 26-28, 2011

More info: www.ifma.org

Over a hundred educational sessions are offered and are also eligible as Continuing Education Units (CEUs).

National School Plant Management Association – 16th Annual Conference

The Sheraton Music City Hotel
Nashville, Tennessee
April 2-5, 2011

More info: www.nspma.org

ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) 2011 Annual Conference

Montreal, Quebec Canada
June 25-29, 2011

More info: www.ashrae.org

BOMA 2011 International Conference & the Every Building Show

Gaylord National Resort & Convention Center
Washington, DC
June 26-28, 2011

More info: www.boma.org

GovEnergy 2011

Duke Energy Convention Center
Cincinnati, Ohio
August 7-10, 2011

More info: www.govenergy.com

Labs 21 2011 Conference

Rhode Island Convention Center
Providence, Rhode Island
September 20-22, 2011

More info: www.i2sl.org

The annual three-day international conference has dozens of technical sessions highlighting new and innovative products designed to usher in the next generation of laboratories.

GreenBuild International Conference & Expo

Toronto, Canada
October 5-7, 2011

More info: www.greenbuildexpo.org

Over a hundred educational sessions are offered and are also eligible as Continuing Education Units (CEUs). This year's expo is a month earlier than usual so mark the dates.

Facility Decisions Conference & Expo

Mirage Event Center
Las Vegas, Nevada
October 11-12, 2011

More info: www.facilitydecisions.com

Call for Feedback and Projects!

Our publication aims to highlight new technologies, relate success stories of graduates and get the word out about new ideas in the facilities management industry. We are open to suggestions: What would you, as readers, like to hear about?

All readers are encouraged to submit their thoughts on content they would like to see, technologies that spark their interest on which they'd like more information, or their own personal successes saving energy and money for their facilities department.

Please, submit your ideas to email address: news@theBOC.info. You can also submit your own successful project story at the BOC web site (www.theBOC.info) under the "For Graduates" section. We'd love to hear from you.

New to BOC?

Listen to a FREE Informational BOC Webcast:

BOC® Informational Webcasts are for newcomers to the program. Learn about Level I and Level II course topics, schedules and certification requirements in detail. Listen in and find out who benefits by attending BOC training and how graduates are improving their facilities.

Live webcasts are held four times a year. Pre-recorded webcasts can be downloaded from the BOC website 24/7.

Informational webcasts last approximately one hour, starting at:

8:30AM - 9:30AM (PST)
9:30AM - 10:30AM (MST)
10:30AM - 11:30AM (CST)
11:30AM - 12:30PM (EST)

Scheduled webcasts for 2011 will be held on February 16th, March 23rd, August 11th & November 9th.

To sign up go to: www.theBOC.info

If that date is not convenient, the site also provides a prerecorded informational webcast.



Check out BOC's Technical Webinar Series!

The BOC web site (www.theBOC.info) offers webinars, both live and prerecorded (available for viewing at your convenience). Register and receive a link, with log-in and password information. Successful completion of each webinar and its accompanying quiz earns you 1.5 continuing education hours towards maintaining your BOC certification. Current prerecorded webinars available include.

- Energy Tune Up: Measurement Tools for Building Energy Diagnostics
- Energy Tune Up: Optimizing Outside-Air Usage & Equipment Scheduling
- Energy Tune Up: Addressing Problems with Sensor Error and Simultaneous Heating & Cooling
- Top Four Energy Tune-up Opportunities
- Boiler Tune-up
- Morning Warm-up Strategies
- IAQ Top Ten Fixes
- Lighting Retrofits: A Fresh Approach
- Demand Control for Ventilation
- Using Data Loggers to Improve Building Performance

LIVE webinars offered in 2011 will be held from 10 AM to 11 AM Pacific Standard Time and cover:

- New Lighting Standards (February 9th)
- Lighting Controls for IEQ and Cost Savings (March 16th)
- New Lighting Technology: A showcase of products and applications (July 21st)
- Low Cost/No Cost Lighting Strategies for Cost Savings (September 8th)

Information on fees and registration is available at the BOC web site as above. A link to the webinar details can be accessed on the home page.

BOC Certification Renewal

To maintain BOC certification, graduates must accumulate continuing education (CE) hours each year following a full calendar year after their graduation. Level I renewal requires five CE hours each year and Level II requires ten. For renewal at both levels, a total of 15 hours is needed. Hours may be earned as follows:

- **Continued employment in building operations**.....2 hours / year
- **Continuing education in building operations**.....Actual hours of classroom time
- **Energy efficiency projects completed at your facility**Up to 11 hours / year
- **Membership in a building operations membership association**.....1 hour / year
- **Offices held in membership associations**.....2 hours / year
- **Awards received for efficient building operations**2 hours / award
- **BOC newsletter quiz – based on the article on pages 5 & 7 of this newsletter, the quiz is available to take online at www.theBOC.info**.....1 hour / passed quiz
- **Completion of an energy consumption benchmark for the previous 12 month period using ENERGY STAR® Portfolio Manager or alternative energy accounting tool**.....3 hours / year
- **Enroll in a BOC webinar and complete its quiz (see webinar announcement on page 10 for details)**1.5 hours / passed quiz

You will be notified by mail when your certification is up for renewal (the anniversary date appears on your wallet card). Once you have received a renewal notice, complete the application form and return it to your program administrator as instructed. Renewal fees are established by the BOC administrator in your state and will be detailed on your renewal notice.

BOC Graduate Numbers Continue to Grow!

As BOC expands across the country, the number of graduates grows as well, with over 8,000 nationwide. Graduates from this year and last hail from Montana to Rhode Island, Minnesota to Hawaii, and represent companies in education, government, military, manufacturing, health care, office real estate and beyond – just about every sector you can name.

Find A BOC Training In Your Area

There are currently over 8,000 BOC graduates throughout the country and that number will continue to grow because the need for educated facilities operations & maintenance personnel is stronger than ever. BOC training is offered in twenty-four states and that number continues to grow as well.

BOC Level I Certification

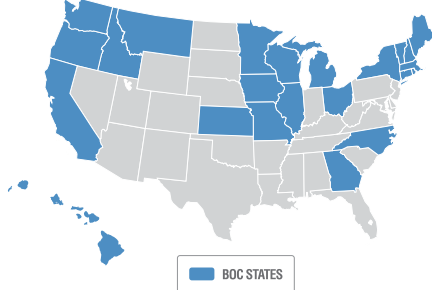
The Level I series comprises 74 hours of training and project work in building systems maintenance. Courses include: Building Systems Overview, HVAC Systems and Controls, Facility Electrical Systems, Indoor Environmental Quality, Operation & Maintenance Practices for Sustainable Buildings, Efficient Lighting Fundamental and Energy Conservation Techniques.

BOC Level II Certification

Level II has 61 hours of training and project work in equipment troubleshooting and maintenance. Courses include four core classes and two supplemental classes. The four core classes include: Preventive Maintenance & Troubleshooting Principles, Advanced Electrical Diagnostics, HVAC Troubleshooting & Maintenance, HVAC Controls and Optimization. See the website for supplemental class topics.

To find and register for a Level I or Level II training in your area, please visit the BOC website at www.theBOC.info. Training is available from Maine to California – and now, even Hawaii!

Building Operator Certification States – 2011



Certification Renewal Reminder

For those BOC graduates whose certification expired in January 2011, the renewal process began in the first week of the year. Graduates due for renewal should have received notification by mail and email from NEEC with an application for renewal. The deadline for 2011 renewal is March 31, 2011. You will need Continuing Education hours to renew your level of certification so don't wait too long! See page 10 for details of renewal requirements for both Levels I and II.

Continuing Education Opportunities for Certification Renewal Credit

Below you will find listings for the web sites of various national organizations that offer continuing education courses that are applicable to annual BOC certification renewal. Check out the Education, Professional Development and Events Calendars at these sites.

APPA: The Association of Physical Plant Administrators

www.appa.org

BOMA: Building Owners & Managers Association

www.boma.org/TrainingAndEducation/BEEP/

BOMI: Building Owners & Managers Institute

www.bomi-edu.org

ENERGY STAR®: Live web conferences, pre-recorded trainings, self-guided presentations

www.energystar.gov/index.cfm?c=business.bus_internet_presentations

FEMP: Federal Energy Management Program Workshops & Conferences

www.eere.energy.gov/

GreenBuild: US Green Building Council

www.usgbc.org

HVACR Education: On-Line Learning for the HVACR Industry

www.hvacreducation.net/

IFMA: International Facility Management Association

www.ifma.org

The International Facilities Management Association has several regional chapters, all of which can be accessed from the association's main web site address above. Be sure to check out the site for the variety of learning options available both online and via seminar.

Utility Energy Training Centers: www.dsireusa.org

Your local utilities may offer energy education events and their sites are sources for training opportunities as well. Regional industry associations also offer a number of options for further education. The link above brings you to a database of state incentives for renewables and efficiencies.

The Future of Lighting

New LED lighting controls are featured in an article in MIT News by David L. Chandler entitled "Illuminating Research." The article highlights research being done at the Massachusetts Institute of Technology on control devices that work with LED lighting fixtures to adjust lighting to suit user tastes. Unlike CFL lighting, LED fixtures can vary the intensity of the light emitted. The user sets preferences on the control devices (pictured below), which are about the size of a business or credit card. The controls gauge ambient light from windows, as well as lighting adjacent to a user work area, to provide the level of light intensity the user needs.

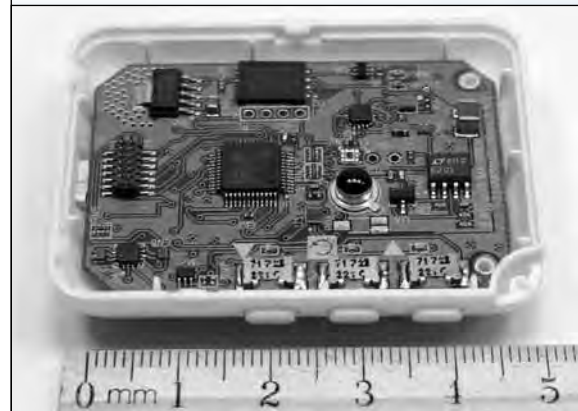


Photo courtesy of MIT Research Associate Matt Aldrich.

Testing so far has revealed that the systems reduce energy usage anywhere from 65% - 90% - and that is with the already highly-efficient LED lights. The article also points out that lighting is 22% of electrical usage in the US.

Research continues to refine the operation of the controls, and there are still questions on the most efficient implementation format, such as single-user devices, area controls, or even individual portable devices. To read more about this new horizon in efficient lighting, check out this link at MIT News:

<http://web.mit.edu/newsoffice/2010/adaptive-lighting-1119.html>. 



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Partners in the BOC program include: Gwinnett Technical College, Midwest Energy Efficiency Alliance, New York State Energy Research & Development Authority, North Carolina Community College System, Northwest Energy Education Institute, Northwest Energy Efficiency Council, Sacramento Municipal Utility District, University of Hawaii – Maui College, Wisconsin Focus on Energy.

Thank you to these sponsors of the Building Operator Certification across the country:

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