WINTER/SPRING 2007

THE BOC Bulletin

A Newsletter for BOC Graduates, Enrollees and their Employers

Weyerhaeuser King County Aquatic Center's Proactive Facilities Managers Get Results

Facilities personnel at the Weyerhaeuser King County Aquatic Center (WKCAC) have become adept at finding the means to best use local resources and cooperative opportunities to promote both energy savings and recycling.

USA Swimming Championship Series in February 2002. *photo by Scott Bisch*

Originally a venue for the 1990 Seattle Goodwill Games, the WKCAC is the second largest natatorium in the country and hosts more than 50 events annually, including Olympic Trials and top national and international competitions for swimming, water polo, synchronized swimming and diving. In fact, it is one of only six facilities nationwide with the capacity to hold such events. While built to be a state-of-the-art facility, rapid changes in facilities equipment and use-of-resources make "state-of-the-art" a moving target. But WKCAC has kept pace.

In one initial change, Scott McDonald, WKCAC Operating Engineer III and a 2002 BOC graduate, used suggestions from his BOC training to establish a phased-in operation of natatorium arena lights, at least ten minutes apart. This change in procedure minimized peak rates established each month, setting the peak at a lower level than would occur if all of the 80 1000-watt metal halide fixtures were to be put on at once.

In 2003, the center focused on improvement projects involving both energy savings and innovative use of recyclable materials. As a part of the area's LinkUp program, which encourages businesses to use recycled materials produced by local manufacturers, old benches were replaced with new Tempo benches. Crafted by Bellingham, Washington's MetaMorf Design, the benches are not only made from curbside recyclables but can also be "re-recycled" when they need replacement.

A new water filtration system was installed using 100% recycled glass to replace silica sand. Glass granules are a more efficient filter for water and also weigh less. Operating costs are also lowered since replacement need only be done every seven years versus every five with silica sand. Over four million gallons of water from the Center's pools are recycled daily.

Throughout the facility's buildings, old sink and toilet fixtures were replace with low-flow and automated models - 83 fixtures in all - and fourteen shower heads were also replaced with low-flow alternatives. Savings in water consumption from these upgrades were an estimated 34% in 2004 and an additional 12% in 2005.

Continued on page 5. See ***Proactive Facilities Management.***

ARTICLES

Reminder: 2006 BOC Grads

By March 2007, you will need Continuing Ed credit to renew your Level certification. Level I renewal requires 5 hours annually and Level II requires 10 hours. See page 10 in this newsletter for details.

Introduction to Lighting Maintenance

by Craig DiLouie and Randy Smith

All lighting systems experience deterioration of performance during operation and therefore require ongoing maintenance conducted either by properly trained in-house staff or an outsourced lighting management company. As the useful light distributed by the lighting system decreases, wattage remains the same, resulting in waste.

In many buildings, lighting systems are maintained in a reactive rather than proactive manner. Lamps are replaced as they fail, a service request is registered and the maintenance department can schedule the replacement with its other priorities.

Defective components such as failed ballasts and broken ampholders are only replaced when they cause the fixture to malfunction. And fixtures are rarely cleaned, although dirt and dust build-up is absorbing useful light rather than distributing it. Considering the waste in labor and energy costs involved, it's generally advisable to consider a planned lighting maintenance program during the planning of the lighting system.

Photo provided by interNational Association of Lighting Management Companies (NALMCO) and the Illuminating Engineering Society of North America (IESNA) Recommended Practice RP-36.

Planned lighting maintenance is the practice of organizing labor and resources to ensure consistent recommended light levels and most economical use of the lighting system. It tunes the lighting system and optimizes performance.

In a planned maintenance program, three actions are taken on a periodic basis:

- *Group relamping: Replacing all lamps en masse at predetermined basis, usually at 60-80% of rated lamp life.*
- *Fixture cleaning*
- *Inspection and troubleshooting*

Planned maintenance strategies can:

- *Reduce nominal labor costs related to fixture relamping and cleaning by up to 70%*
- *Reduce cost by concentrating lamp purchases into fewer, high-volume buys*
- *Produce higher light levels over the life of the lighting system*
- *Generate lighting upgrade opportunities such as reduced-output energy-saving lamps that take advantage of higher light levels to reduce energy costs*
- *Ensure proper inspection and upkeep of the lighting system, such as ensuring batteries are charged for emergency lighting in compliance with regulations.*

The cost of using lifts and other devices to perform lighting maintenance can raise the cost of performing lighting maintenance.

LIGHTING MAINTENANCE FORMULAS

The following formulas can assist you in mapping out a maintenance plan for your facility:

Lamp Life
Calendar Lamp Life (Years) = Rated Lamp Life (Hours) ÷ Annual Hours of Operation (Hours/Year)

Lamp Burnout Factor
Lamp Burnout Factor = 1 - Percentage of Lamps Allowed to Fail Without Being Replaced

Group Relamping
Cost Annualized Cost ($) = A x (B + C)
A = Operating Hours/Year ÷ Operating Hours Between Relampings B = (Percentage of Lamps Failing Before Group Relamping x Number of Lamps) x (Lamp Cost + Labor Cost to Spot Replace 1 Lamp)
C = (Lamp Cost, Group Relamping + Labor Cost to Group Relamp 1 Lamp) x Number of Lamps

Spot Relamping Cost
Average Annual Cost ($) = (Operating Hours/Year ÷ Rated Lamp Life) x (Lamp Cost + Labor Cost to Replace 1 Lamp) x Total Number of Lamps

Cleaning Costs
Cleaning Costs ($) = Time to Wash 1 Fixture (Hours) x Hourly Labor Rate ($) x Number of Fixtures in Lighted Space

TROUBLESHOOTING

To the right (page 3) are general troubleshooting guidelines for incandescent and fluorescent lamps and lighting systems. Strictly and completely observe all applicable safety regulations, such as OSHA. These guidelines are published for general educational purposes only. For more information, consult the lamp, ballast or fixture manufacturer; ballast manufacturers publish good troubleshooting guides.

About the Authors

This article is reprinted with permission and can be found at www.lightingdesignlab.com. Randy Smith is the Librarian and Webmaster for the Lighting Design Lab and has over two decades of experience in the field of energy efficiency. Craig DiLouie is a principal of ZING Communications and provides marketing consulting services to the lighting industry.

INCANDESCENT LAMPS

SYMPTOM	POSSIBLE CAUSES	SOLUTIONS
Lamp won't light	Normal end of life	Replace the lamp
	Lamp not seated in socket properly	Tighten the lamp; if this doesn't work, pull out the metal contact inside the socket so that it makes good contact, making sure first that the fixture is de-energized
	Lamp is defective	Replace the lamp
Short average life	High supply voltage	Overvoltage significantly decreases incandescent lamp life
	Lamps operating near neon tubing	Install metal shield between neon and incandescent lamps
	Vibration or shock or a compact fluorescent lamp	Replace with rough-service lamp, which is more resistant to vibrations/shocks,
Deposit on inside of the glass bulb	Defective lamp	Air is entering the lamp through a crack; replace the lamp. Check for signs of moisture, which can result in cracks; replace with a silicone-coated lamp
Blistering/Bulging on bulb	High operating temperature	Check to make sure the lamp is the appropriate wattage for the fixture (refer to the manufacturer's recommendations for the luminaire and the socket); replace with the right lamp. Also check for cracks; replace with a silicone-coated lamp. Finally, check for a manufacturer defect; replace the lamp.

FLUORESCENT LIGHTING SYSTEMS

SYMPTOM	POSSIBLE CAUSES	SOLUTIONS
Lamp does not light, or starts erratically or slowly	Lamps are not aligned/seated properly in their sockets	Position lamps properly
	There is a lamp or fixture problem	Install a known good lamp to determine if the problem is in the lamp or fixture. If good lamps light, then check the removed lamps in a fixture that is operating properly
	Problem is with the ballast	Replace the ballast
Lamps known to be good are not lighting (preheat ballast)	Manual reset starter is not reset	Push button on starter
	The starter has failed	Replace the starter
	Problem with ballast	Replace the ballast
Lamps known to be good are	Lamp and ballast are not compatible Lamps are dirty	Check the lamp and ballast labels and replace as needed (replace the lamp first) not lighting Clean the lamps properly
	Starting aid (metal strip) is not properly positioned	Correct the starting aid's grounding and positioning
	Supply voltage is not right for the lamp	Check the voltage
	Problem with fixture wiring catalog, and correct as needed	Check the wiring against the wiring diagram on the ballast label or manufacturer's
	Problem with ballast	Replace the ballast
Early lamp failure	Lamp has failed normally	Individual lamps do not fail in a predictable manner, only large groups of lamps do; at rated life, 50% have failed, and 50% will fail afterwards
Reduced average life	Frequent starting	Frequent lamp switching reduces average life
	HO/VHO incompatibility; for example, HO lamp may be operating on VHO ballast, which is incompatible	Make sure lamp and ballast are compatible
Heavy blackening at ends of lamp and short lamp life	Defective lamp, open wiring or poor wiring in socket, poor contact in the socket	Seat lamps properly; if they are already seated properly, then check for proper heater voltage at the sockets
	Problem with the ballast	Replace the ballast
One lamp is not lighting, the other is glowing only dimly on a two-lamp series sequence ballast	The lamp that is not lighting (second lamp T in the series circuit) has reached normal end of life	Replace the failed lamp
Both lamps are out on a two-lamp series sequence ballast	The first lamp in the series circuit has reached normal end of life	Replace the failed lamp; if both lamps do not light, then there may be a problem with the ballast (also see "Lamps known to be good are not lighting")
Blinking (preheat ballast)	Normal end of lamp or starter life	Replaced the lamp or starter as needed
Ends of lamp are lighted but the lamp does not light fully	Failed starter	Replace the starter
Swirling, fluttering or spiraling effect in the lamp	Some lamps experience this during normal operation	Will stop after several hours of operation
	Low ambient temperature	Check the ballast label for minimum starting temperature; replace ballast with cold service ballast or jacket the lamps
	Lamp and ballast are incompatible	Replace as needed
	There is a problem in the ballast	Replace the ballast
Flickering (flicker)	Magnetic ballast operation	Not everyone's vision is sensitive to this. Ballasts control voltage to start lamps and maintain operation. Magnetic ballasts fire at a 60 cycle per minute rate, whereas electronic ballasts fire at thousands of times per second, which means no perception of flicker is possible.

BOC Grads Making A Difference


David Quick

BOC graduate **David Quick**, Engineering and Safety Manager at Mount Carmel Hospital in Colville, WA, needed to replace the facility's damaged two-stage boiler burners. The building was constructed in 1950 and the original boilers had been replaced in 2003, after 52 years of service. New burners were also installed, but the flame heads were burning out (deforming) after only two-and-a-half years, an obvious tip-off that there was an issue with the two-state low-nox burners.

Researching available options and recognizing that it is more energy-efficient when a burner runs continuously but at controlled minimum levels rather than in the on/off two-stage set up, Quick chose a multi-stage burner boiler, a "Rolls Royce" option for the system in comparison with the existing one. The specs of the new boiler burner indicated an average energy savings of 7% would result and, intuitively, this seemed to be the result.

However, it was impossible to compare apples-to-apples (YOY) figures because midway through the year after installation, it was apparent that the system's 32 steam traps were a bigger issue and needed to be replaced. Most of the traps (at least half) were from the original 1950 construction and in the ensuing years, these had been repaired numerous times with whatever means were available. These traps were failing progressively and the situation became critical when it appeared that the facility could be spending an estimated $1,000 to $2,000 a month extra in fuel costs alone due to trap leakage if no replacements were made.

The replacement process began. Due in part to age, repair kits could not be found for many of the older traps, and Quick therefore decided to replace all the traps from one source with one brand, if possible. He knew that it would be more cost-effective in the long run to have an outside consultant/specialist replace the traps due to physical sizes, multiple pressures and capacity considerations. To date, the project is about 25% complete but Quick says savings are already obvious. He anticipates a savings of $1,000 per month in the winter months, which would give the project a payback of about two years.

And what of the savings from the high-efficiency boiler burner? While frustrated that they did not have the time and circumstances to validate the 7% savings claim, Quick says he "chooses to believe" the claim is accurate, or ballpark at a minimum. Inarguably, what the installation accomplished was a much smoother operation. As Quick recounts, "Most boiler failures occur during start up or shut down, so it's best to keep the burning going continuously, even at minimum capacity, to avoid pre- and post-purge cycles." Being a multi- versus a two-stage boiler burner, the new installation can accomplish this and savings could certainly result from reduced wear and maintenance.

The steam trap replacement project was submitted to the hospital's energy provider, Avista, and the calculated potential incentive/rebate for the work will be $5,579 - a pleasant surprise that is, Quick emphasizes, both important to remember and to take advantage of.


Stewart McLaughlin

Stewart McLaughlin, Assistant Facilities Manager at Tecom, Inc. in Portland, OR and BOC Level II graduate has had a variety of projects underway over the past several years at the Bonneville Power Administration building under Tecom's facilities management operations.

First up was a project to assess three closed circuit coolers and two cooling towers to see if renovation or replacement was the better option. The consultant engaged did an inspection of the units and determined that while renovation might be a less expensive alternative, it was a short term solution, giving only an additional 5-7 years of life to the 16 year-old equipment. Replacement with up-to-date, higher efficiency equipment – such as using induced draft towers when replacing the cooling towers – would yield 20-30 years of service, be less disruptive to building operations and reduce operating costs. The addition of variable frequency drives (VFDs) also increased operational efficiency, thus saving on energy costs, where appropriate. In some cases where there is no load variation, VFDs simply do not make a difference. But where load variations swing, such as in their cooling towers, savings from these energy-efficient drives is significant.

More recently, they completed hot water pumping system upgrades resulting in 25% less energy consumed, an estimated $540 per year savings energy-only (maintenance savings is excluded, but $4,721 was spent in one 4-yr period repairing a hydro-constant and Program Logic Controller (PLC)). By replacing hydro-constant drives, again with VFDs, they now have more reliable controls that require less maintenance. Another benefit of this upgrade was that they were able to go from the older PLC to a newer micro-processing controller, allowing for more efficient oversight of the system. Still another bonus was a rebate from the Energy Trust of Oregon (ETO) based upon the VFD portion of the upgrade, resulting in an estimated 50% savings on the VFD's installation cost and, since the drives were due for replacement, an instantaneous payback.

Currently in progress is a project to replace pneumatically actuated building controllers with electrically actuated ones. The latter system allows building operators to add a "dead band" to the heating and cooling system. The beauty of this feature is that the building fan systems do not need to expend energy within the 500+ zones wherein their temperatures are between preset limits, such as ASHRAE's recommended 68°F - 76°F comfort range.

Stewart says energy-efficiency projects are always underway and with the constant improvements in facility operating equipment, he is always on the lookout for more.

Proactive Facilities Management *(Continued from page 1.)*

Outstanding issues also requiring attention were lighting, heating and heat reclamation for the locker rooms, and building control systems. The lighting and locker room issues were the priorities and, especially in the case of the heating system, high ticket items.

Prior to project implementation, large electric duct heaters were used to heat the deck locker rooms, classrooms and hallways. 100% of the heat in these areas was being exhausted. With the installation of a glycol heat reclaim system, they were able to reclaim 50% of the heat being lost. In the facility's large open lobby, a similar situation existed. A more efficient combination gas-air conditioning system was installed bringing the space up to current energy codes.

McDonald investigated the possibility of utility incentives for the energy-saving projects and found that the WKCAC's utility provider, Puget Sound Energy (PSE) had an Energy Conservation Grant program **(www.pse.com/solutions/ForBusiness_Efficiency-Programs.aspx)** that would cover up to 70% of each qualifying project up to $200,000 in a calendar year. A cost payback minimum of eight years was required. McDonald worked with King County Parks' management, PSE and engineering personnel to determine project parameters and costs so that the benefits of the upgrades could be presented for internal budgeting and possible grant funding. This became the 2005 Capital Improvement Project (CIP), with special priority given to the lighting and heating issues.

Joe Hicker, Project Manager for the CIP, coordinated project designers and contractors, as well as the grant application process. The deck level heating and ventilation system project qualified for PSE's funding, a grant of $96,000.

New LON (local operating network)-based controls, first installed in 2004, have also helped in maintaining high efficiencies in the system. With the LON in place, the facility is integrated, functioning as a whole, and McDonald can use a laptop to make changes or adjustments to the facility's systems from anywhere on the grounds, given the WiFi capacity.

In addition to the heating system changes, all old fluorescent lighting was replaced with T/5 fixtures and all exit signs were changed out for LED units. For 2006, electricity usage from the locker room and lighting improvements was reduced by 6% in KWH terms. With rate increases, the cost savings was about 4%. Motion detectors were added to vending machines so that power shuts off during the extended periods usual downtimes of overnight and weekends.

The facility's next energy project is the natatorium arena lights. Studies are under way to find the best fixtures to maintain existing foot-candles yet reduce energy consumption. Their goal is 50% reduction and another successful PSE grant application. Also on tap is a project aimed at reducing electrical consumption for property/parking lots, which constitute about half of the facility's more than eleven acres.

The work continues and it is the nature of facilities management that there are always opportunities for upgrades and improvements as technology continues to advance. Proactive facilities managers, such as those at WKCAC, always keep an eye out for new possibilities and look for ways to effectively and cost-consciously implement them.

TECH SHOWCASE

Innovative and Economical Exit Sign Options

In a feature article published in the November 2006 issue of Buildings magazine, Michael O'Connell highlights the advantages of the latest in exit sign technology in "The Exit-Sign Revolution".

LED and tritium exit signs have obvious energy-saving advantages over the traditional electrically-powered option. However, they have disadvantages in the areas of production and proper disposal. The newest technology, photoluminescent (PL) exit signs conquers these issues.

While PL exit signs have been around since the early nineties, advances in materials used have made them a more viable option. Based on the same technology as "glow-in-the-dark" toys and gadgets, PL signs absorb ambient light and then, when light is removed, they "release the stored energy as an intense green/yellow glow." Because of the improved materials, the light emitted is more intense and lasts for a longer period of time.

There is also no on-going power cost because PL signs get their light from area lighting. Parameters of positioning are specific but not only are PL exit signs easily accommodated by architects and engineers in their design of building lighting systems, they are also cheaper to install and use than LED signs. As far as maintenance is concerned, all PL signs need is an occasional wipe-down with a damp cloth and confirmation that the source lights are operational.

For specific details about the advantages of photoluminescent (PL) versus LED and tritium exit signs and the significant energy and time savings of PL, reference the complete article at the www.Buildings.com site. The direct link is: **http://www.buildings.com/Articles/detailBuildings.asp?ArticleID=3423**

Congratulations!

BOC Level I & II Students Certified in California, Oregon and Washington July – December 2006

Level I Certified Students

Agahan, Abelardo, Raytheon Company
Alam, Syed, State of California
Alexander, Ralph, Naval Ambulatory Care Center
Alvarez Casillas, Miguel, USC Facilities Mgmt Services
Anderson, Gabriel, Cal State Univ Long Beach
Arcangel, Willie, USC Fac Mgmt Svcs - Norris Hospital
Ashwill, Kevin, City of Beverly Hills
Bedford, Matthew, Sonoma State University/CSU
Blatnick, Lisa, CA State Teachers' Retirement System
Bomba, David, Azusa Pacific University
Bradley, Rory, Intel Corporation
Bradshaw, Marlene, NAVFAC FEC PW Ventura County
Bruce, Craig, Northrop Grumman
Brunozzi, Dominic, US Navy
Cafaro, Gary, Douglas Emmett & Co.
Callaway, David, David Douglas School District
Cardenas, Santos, Goodale & Barbieri
Carlson, David, SMUD
Carver, Gary, Golden Gate Bridge Hwy & Trans District
Charles, Gregory, Raytheon, Facilities Maintenance
Cheney, Terrell, Sonoma State University/CSU
Costello, Cynthia, NAVAIR, Code 518000E
Deiter, Steven, Murrieta Valley Unified School District
Dell'Era, David, County of Marin
Demyanovich, Robert, RJD Technologies, Inc.
Duprie, Bonnie, East Valley School District #361
Durinick, Raymond, Sonoma State University/CSU
Ferebee, Curtis, SMUD
Fong, Robert, Naval Air Weapons Division
Francia, Roberto, Guidant Corporation
Fultz, Greggory, Othello School District
Galloway, James, NAVFAC SW
Gamache, Thomas, DOD Navy - NBVC Point Mugu PWD
Garcia, Cheryl, San Bernardino City USD
Gaylor, Matthew, Scios, Inc.
Gonzalez, Teresa, CA State Teachers' Retirement System
Guerrero, Jr., Epifanio "Jun", Raytheon Company
Gutierrez, Mark, Oxnard School District
Hall, Jerry, Battell PNNL
Hambrick, Caren, Lawrence Livermore National Lab
Hamilton, Chris, City of Beverly Hills
Hanna, Glenn, US Navy
Hardy, John, San Bernardino City USD
Harvey, Jimmy, US Navy PWD Ventura County
Hostetler, Paul, Children's Hospital Central CA
Houston, Harold, US Navy Public Works
Janson, Ken, East Valley School District #361
Jones, Dale, East Valley School District #361
Jones, Jeffrey, Sacramento Bee
Judge, Kenneth, Raytheon, Facilities Maintenance
Jung, Robert, Providence Hood-River Memorial Hospital
Kempton, Allan, Pac-hill Limited Partnership
Kerr, Terry, East Valley School District #361
Kotake, Scott, Raytheon, Facilities Maintenance
Lamb, Lyle, USPS
Leahy, Richard, County of Marin
Lee, Hun (James), USC Facilities Mgmt Services
Lemieux, Paul, SMUD
Levin, Thomas, US Coast Guard Trng Ctr Petaluma
Lewis, Mark, Rose Hills Company
Majd, Al, Hilton Anaheim
Malandrinos, Jill, Raytheon Company
Mansell, Thomas, US Coast Guard Trng Ctr Petaluma
Manship, Kenneth, Kennewick General Hospital
Mariazeta, Roberto, SMUD
Martinez, Celestino, Sonoma State University/CSU
Massa, Robert (Tony), Othello School District
Mimnaugh, Matthew, WA State Dept of Transportation
Minich, Robert, UCLA Healthcare Facilities
Moreno, Henry, Rose Hills Memorial Park
Morris, William, US Navy PWD Ventura County
Murray, Elise, Navair NAWCWD 2.0 Contracts
Nathanson, Michael, City of Corona
Nelson, Christopher, Los Angeles County Office of Education
Nelson, Richard, Battelle PNNL
Nieva, Vernon, USC Fac Mgmt Svcs - Norris Hospital

Level I Certified Students

Olson, Jonathan, NAWCWD-Pt Mugu
Pearsall, Rick, Sonoma State University/CSU
Peterson, Jay, NSWC PHD Code 107
Pierce, Tracy, WA State Dept of Transportation
Quiroz, Ricardo, US Navy NOSC Port Hueneme
Rasey, James, US Navy (DOD)
Ray Jr., Will, Department of the Navy
Reed, Brian, CA State Teachers' Retirement System
Reisenauer, Sarah, CSULB, Facilities Management
Reynolds, Patrick, Access Business Group
Romero, Sr., David, Raytheon, Facilities Maintenance
Sauthoff, Taunya, US Navy/Naval Surface Warfare Center
Sayles, Randy, Azusa Pacific University
Scheier, Patrick, Jones Lang LaSalle
Serna, Kenneth, US Navy, NOSC
Sewell, Steven, SMUD
Shakeridge, Elliot, Raytheon, Fac Maint, EO Bldg
Sheppard, Daniel, Azusa Pacific University
Simmonds, James, SMUD
Smith, John (Jack), Avista Utilities
Stolle, Clark, Fluor Hanford, Inc.
Tews, Joel, US Navy, NAWCWD
Thomas, Chris, Northrop Grumman
Thomas, Tim, Azusa Pacific University
Thompson, James, NAVSEA Port Hueneme Div NSWC
Tindell, Terry, San Mateo County Comm College District
Tuttle, Steven, Vancouver School District 37
Van Winden, Anthony, US Coast Guard
Vastine, Vint, Northrop Grumman
Vice, Larry, County of Sacramento
Vorhees, Scott, US Coast Guard
Walker, Teresa, Vought Aircraft Industries, Inc.
Watanabe-Tuttle, Lynn, CA State Teachers' Retirement System
Wetter, Dean, City of Corona
Whitehead, Martin, City of El Segundo
Wrede, Kent, Fortuna Union High SD
Young, Shaun, St. Joseph Medical Center
Zaw, Tom, USC Facilities Mgmt Services

Level II Certified Students

Bradley, Rory, Intel Corporation
Burroughs Jr., Charles, City of Fairfield, Public Works
Calhoun, Micheal, Serrano Hotel (Kimpton Group)
Callaway, David, David Douglas School District
Campbell, David, Openwave Systems, Inc.
Cunningham, Patrick, County of Marin, DPW
Duarte, Douglas, Raytheon Space and Airborne Systems
Esterman, Igor, ROK Properties
Ferguson, Dennis, Clackamas ESD
Fleming, Collin, Sheraton Portland Airport Hotel
Gaylor, Matthew, Scios, Inc.
Gonzalez, Americo, ABM Engineering/Rim Pacific Mgmt
Gonzalez Jr., Pedro, Sutter Tracy Community Hospital
Gulli, Anthony, SMCCCD/Skyline College
Harper, Cheryl, Providence Hood River Mem Hospital
Hashagen, Keith, Oregon State University
Hatheway, Steve, Siemens Building Technologies
Irving, Benjamin, BIG
Jackson, Robert, Doctors Medical Center
Jimenez, Victor, Verizon Wireless
King, Thomas, Community Hospital of Long Beach
Kwan, David, Bay Valley Medical Group
Martinez, William, Huntington Hospital
Murphy, Jack, City of West Sacramento
Perez, Raul, Raytheon Space and Airborne Systems
Poore, Jim, Oregon Department of Corrections
Reasoner, Roch, City of Beaverton
Rivera, Danny, Community Hospital of Long Beach
Roy, Dan, Capital Medical Center
Sandner, Robert, Cushman & Wakefield
Spacher, Robert, SMCCCD/Skyline College
Thompson, Gary, City of Beaverton
Thomson, Matt, Gunderson Dettmer, LLP
Yount, Dan, Intel Corporation

Quality Ingredients: 10 Steps to Improve Your Lighting

by Randy Smith

Lighting quality in a specific space is always the result of the blending of the architecture, light source(s), relation to the visual task, and the preferences and needs of the users. This makes it very hard to develop a single formula that will always create magnificent lighting in every space. The debate over creating a 'recipe' for quality lighting will go on for a long time. Here are some simple lighting measures that will almost always improve your lighting quality.

Switch from cool and warm-white lamps to rare earth (RE)
- RE lamps give better color quality and often produce more light.
- Virtually all T8 lamps are RE.

Switch from magnetic ballasts to electronic
- Electronic ballasts help eliminate flicker and hum (big on the list of user complaints).

Put more light on ceilings and walls
- Ceiling brightness makes spaces seem taller.
- Brighter walls make spaces seem bigger.
- Uniform brightness can reduce user eyestrain from 'glare' problems.

Add paint to your lighting tools
- Lighter color values improve the efficiency of your lighting equipment and make spaces brighter.

Include daylight in your lighting plan
- Daylight is usually the first choice for users - it has the best color, gives a connection to seasonal rhythms, and usually comes with a view.

Light architectural details and artwork
- Give users a sense of depth, shadow and contrast for visual variety.
- The eye needs variety to stay interested and awake.

Determine who will use the space
- Age of users changes the amount of light needed for seeing and the amount of glare that can be tolerated.

Determine what the users will be seeing
- Visual tasks are the basis for when, where and how the light should be distributed.

Calculate the lighting performance of your designs
- Create good estimates of the lighting distribution in the space don't just fill in the holes in the ceiling grid.
- Manual lighting calculations are not hard to learn.
- Lighting software is easily available.

Know when to hire a lighting professional - and do so
- Good lighting designers offer a range of solutions to lighting problems - knowledge of equipment, creative applications and comprehensive project management.

Following these tips won't necessarily win you an international award in lighting design. But they might help reduce some of your (and your users) lighting headaches.

Randy Smith is the Librarian and Webmaster for the Lighting Design Lab and has over two decades of experience in the field of energy efficiency.

ANNOUNCEMENTS

BOC National Expansion Continues

The BOC is pleased to announce that North Carolina and Iowa are the latest additions to the roster of states now participating in the program. BOC certification is now recognized in twenty states, from Maine to California, a strong and steady expansion that attests to the value of the training and credential.

First BOC Graduates Emerge from CA Energy Efficiency Partnership

The UC/CSU/IOU Energy Efficiency Partnership has recently highlighted BOC training as a part of its education program. The first of what will be many trainees completed Level I certification in 2006. Congratulations to Gabriel Anderson of CSU Long Beach, certified in August, as well as Celestino Martinez and Rick Pearsall, both of Sonoma State University, certified in November.

BOC Now an IFMA Approved Provider

Already recognized as an "exemplary program" by the American Council for an Energy-Efficient Economy (ACEEE), the BOC was recently approved by the International Facilities Management Association to be an IFMA Approved Provider Program for the Facilities Management Professional (FMP) and the Certified Facility Manager (CFM) designations, allowing IFMA members the opportunity to earn and maintain their professional status with the training BOC provides. Find out more at: www.ifma.org/learning/fm_credentials/fmp_approved_prov.cfm

NSPMA & NEEC: Partners in M&O Staff Credentialing

Acknowledging the BOC training as a leader in energy efficiency education for facility M&O staff, the National School Plant Management Association (NSPMA) has entered into an educational partnership with The Northwest Energy Efficiency Council (NEEC), the program's sponsor. Under the partnership, NSPMA members will be eligible for training and credentialing opportunities through NEEC's BOC program. Find out more at: www.nspma.org/

Continuing Education Opportunities
For Certification Renewal Credit

Below you will find listings of various organizations that offer continuing education courses that are applicable to annual BOC certification renewal. Check out the Education and Events Calendars at these sites or call for information regarding upcoming training opportunities.

BetterBricks Professional Training Program
Website: www.BetterBricks.com
Contact: 206-343-3960

BOMI – Building Owners & Managers Institute
Class Information: www.bomi-edu.org

BOMA – Greater Los Angeles
Class Information: www.bomagla.org

CASBO – California Association of School Business Officials
Class Information: www.casbo.org

California Society for Healthcare Engineering
Class Information: www.cshe.org

California Utility Collaboration – Energy Efficiency Center
Sponsoring utilities are: Pacific Gas & Electric, San Diego Gas & Electric, Southern California Edison, Southern California Gas.

Class Information: www.californiaenergyefficiency.com/index.html

Use this link to access the sponsoring utilities' energy efficiency web sites. Each utility's web site lists education and trainings.

Energy Services
Class Information: www.energyexperts.org/calendar/

The Energy Resource Center (ERC)
Offering food service industry seminars
Website: www.socalgas.com/business/resource_center/erc_home.shtml

FSTC – Food Service Technology Center
Website: www.fishnick.com/education/seminars/list.php

See the web sites below for several Food Service Energy Efficiency courses offered by the following utilities:

San Diego Gas & Electric: www.seminars.sdge.com
Southern California Edison: www.sce.com/ctac
Southern California Gas: www.socalgas.com/erc
Pacific Gas & Electric: www.fishnick.com/education/seminars

FEMP – Federal Energy Management Program Workshops & Conferences
Website: www.eere.energy.gov/sro/
For WA, OR & CA, you can also try www.eere.energy.gov/regions/western/events.html

HVACR Education: On-Line Learning for the HVACR Industry
Website: www.hvacreducation.net/

IFMA International Facility Management Association
Website: www.ifma.org

NEEI - Northwest Energy Education Institute
Website: www.nweei.org
Contact: Erik Westerholm at 541-463-3154 or
E-mail: westerholme@lanecc.edu

Northwest Lighting Design Lab & Portland Daylighting Lab
Class Information: www.lightingdesignlab.com/calendar/index.html
Registration Questions: 206-325-9711 x0 or 800-354-3864 x0

Sacramento Municipal Utility District
Class Information: www.smud.com/education/index.html

The UC/CSU/IOU Partnership (University of California, California State University, Investor-Owned Utility Energy Efficiency Partnership)
Website: http://uccsu.northwoodsoft.com/

University of Washington Engineering Professional Programs
Phone: 866-791-1275
E-mail: west@engr.washington.edu
Website: www.engr.washington.edu/epp

WAMOA – Washington Association of Maintenance & Operations Administrators
Website: www.wamoa.org

Washington State Society for Health Care Engineering
Website: www.wsshe.org

WSU Energy Program – Continuing Education Calendar
Website: www.energyideas.org

Learn more about the program!
Join us for a *FREE* BOC Informational Web Cast.

The web cast allows you to conveniently view and listen to an overview of the BOC program from the comfort of your office. All you need is a desktop browser and a telephone!

The presentation includes:

- Who benefits by attending BOC training.
- Level I and Level II course topics, schedules, and certification requirements.
- How BOC graduates are improving their facilities.

Web cast dates are March 1, July 25th and October 25th all from 8:30 – 9:30AM (Pacific)

To sign up, go to www.theBOC.info

BOC Certification Renewal

To retain BOC certification, graduates must accumulate continuing education (CE) hours each year, following a full calendar year after their graduation. Level I certification renewal requires 5 CE hours each year, and Level II renewal requires 10 CE hours each year. The hours may be earned in any of the following ways:

BOC Certification Renewal Activities	CE Hours Equivalency
• 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 per 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 (see below)	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 hrs/year equivalency

You will be notified by mail when your certification is up for renewal (your renewal date appears on your wallet card). Once you have received a renewal notice, complete the short application, provide a list of your certification renewal activities from the past year and return the information to NEEC. For 2007, the renewal fee is $45 for each of Level I and Level II, or $75 for a "combo" renewal of both Level I and Level II.

Easy Certification Renewal Credit

Another easy way to get some continuing education credits for your yearly certification renewal requirement is right here in the BOC Bulletin. Just read the featured technical articles (pages 1-4 and continued online), then take the short quiz provided on page 11 of the newsletter. Send or fax it back to us for one CEU credit hour per quiz passed, along with your recertification application.

Conferences & Symposiums

National and Regional – Spring 2007

NATIONAL

National Facilities Management & Technology Conference & Symposium
Maintenance Solutions Expo
Baltimore Convention Center
Baltimore, MD • March 20-22, 2007
More info: www.nfmt.com

Total Facility Management Show
The Navy Pier
Chicago. IL • April 17-19, 2007
More info: www.tfmshow.com

National Conference on Building Commissioning
Sheraton Towers
Chicago, IL • May 2-4, 2007
More info: www.peci.org/ncbc/ncbc.htm

National School Plant Management Association
Hyatt Regency
Minneapolis, MN • May 20-24, 2007
More info: www.nspma.org

OREGON

Northwest Plant Engineering & Facilities Maintenance Show (NWPE)
Oregon Convention Center
Portland, OR • May 16-17, 2007
More info: www.facilitiesexpo.com (See Quick Links)

CALIFORNIA

Facility Management Show West (WESTFAC)
Anaheim, CA • Feb 28 - March 1, 2007
More info: www.westfac.com

Central Valley Plant Engineering & Facilities Maintenance Show (CVPE)
Modesto Centre Plaza
Modesto, CA • March 14-15, 2007
More info: www.facilitiesexpo.com

CASBO (California Association of School Business Officials)
San Jose, CA • April 12-16, 2007
More info: www.casbo.org

CSHE Annual Institute (California Society for Healthcare Engineering)
Holiday Inn on the Bay
San Diego, CA • April 18-20, 2007
More info: www.cshe.org

25th West Coast Energy Management Congress (EMC)
Long Beach Convention Center
Long Beach, CA • June 6-7, 2007
More info: www.energyevent.com

WASHINGTON

Powerful Business Bi-Annual One Day Energy Conference
Washington State Trade and Convention Center
Seattle, WA • May 24, 2007
More info: www.electricleague.net/

Introduction to Lighting Maintenance

REVIEW QUIZ

*Here is an easy way to **earn one continuing education hour** towards annual BOC re-certification. Read the article Introduction to Lighting Maintenance that begins on page 2 and take this short quiz on the material. Mail or fax your answers to our offices, with your certification renewal application, as directed at the end of the quiz. With a passing grade, we will apply one credit hour to your record.*

Check your answer(s):

1) As effective light emitted from a light system decreases, perhaps as a result of dust build-up, wattage remains the same, resulting in:

   a. _____ a shorter lamp life
   b. _____ decreased operating cost
   c. _____ increased operating cost
   d. _____ less available light

2) Proactive light system maintenance is more effective than reactive maintenance, even though it is more expensive.

   a. _____TRUE b. _____ FALSE

3) Group relamping (replacing all lamps at the same time) is usually done at _____ of rated lamp life:

   a. _____ 75%
   b. _____ 60% - 80%
   c. _____ 70% - 90%
   d. _____ 66%

4) When planning a lighting maintenance budget, costs are based on fixture, bulb and labor costs.

   a. _____TRUE b. _____ FALSE

5) Which of the following does NOT shorten the life of an incandescent lamp?

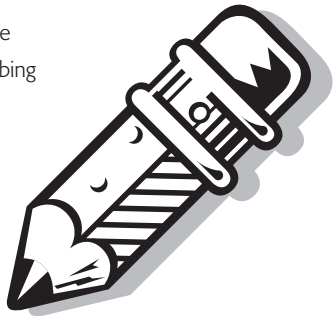
   a. _____ lamp is located near neon tubing.
   b. _____ overvoltage
   c. _____ undervoltage
   d. _____ vibrations or shocks to the unit

6) In a two-lamp series sequence ballast, it is common for both lamps to go out at the same time.

   a. _____TRUE b. _____ FALSE

7) Which two of the following factors cause blistering or bulging on a bulb?

   a. _____ dirt in bulb
   b. _____ inappropriate wattage
   c. _____ proximity to neon tubing
   d. _____ cracks



8) Lamps fail at predictable rates.

   a. _____TRUE
   b. _____FALSE

9) Which of the following result in shorter lamp life (check as many as apply)?

   a. _____ faulty wiring
   b. _____ frequent switching
   c. _____ voltage too high for fixture
   d. _____ improper seating of lamp to fixture

10) How do you fix a fluorescent lamp that is lighted at the ends but is not fully lit?

   a. _____ replace the starter
   b. _____ replace the ballast
   c. _____ replace the lamp
   d. _____ reset lamp with a quarter turn

END OF QUIZ

We include a quiz like this in each of our bi-annual newsletters. To submit your completed quiz for re-certification credit (1 credit per quiz passed), please complete the following and either fax it to 206-292-4125, or mail it to: **BOC Quiz, NEEC Office, 157 Yesler Way, Suite 409, Seattle, WA 98104.** *Please remember to send it with your certification renewal application.*

Your Name:_____

Title: _____

Employer: _____

Address: _____

City:_____

State: _____

Zip: _____

Phone: _____

Fax: _____

Email: _____

Building Operator Certification
157 Yesler Way • Suite 409
Seattle, WA 98104-2527

RETURN SERVICE REQUESTED

BOC... *Energy Efficiency Through Operator Training.*
Proud member of:

CONTACT US:

Website:
www.theBOC.info

BOC Phone:
206-292-4793 ext. 2

BOC Fax:
206-292-4125

Email:
Admin@theBOC.info

Thank you to these sponsors of Building Operator Certification in California, Oregon & Washington:

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Snohomish County PUD • Southern California Edison • Southern California Gas
Tacoma Power • U.S. Dept. of Energy, Federal Energy Management Program

Editor and Contributing Writer: Christine Doonan
Graphic Design: Thom Harris Design

2007 COURSE SCHEDULE *

BOC Level I Certification
The Level I series comprises eighty hours of training and project work in building systems maintenance. Courses include: Building Systems Overview, HVAC Systems and Controls, Facility Electrical Systems, Indoor Air Quality, Environmental Health & Safety Regulations, Efficient Lighting Fundamental and Energy Conservation Techniques. See websites for cost and updated dates and locations.

BOC Level II Certification
Level II has seventy 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 websites for supplemental class topics, dates and locations.

California – Level I – www.theBOC.info/ca
Camp Pendleton.....Feb 07 - ***(Sold out)***
LeMoore NAS.....Feb 07 - ***(Sold out)***
Bakersfield .....Feb 13 - Dec 4, 2007
San Jose .....Mar 0 7 - ***(Sold out)***
Santa Barbara.....Mar 13 - Sept 11, 2007
Irvine.....Mar 14 - Sept 12, 2007
San Francisco .....Apr 07 - ***(Sold out)***
Long Beach.....Apr 18 - Oct 17, 2007
Northridge.....Apr 19 - Oct 18, 2007
San Diego .....May 2 - Nov 7, 2007
Eureka ..... May 9 - Nov 14, 2007
Chico.....May 10 - Nov 15, 2007
Sacramento ..... Starts Sept 2007
Ontario ..... Starts Oct 2007
San Jose ..... Starts Nov 2007
San Francisco ..... Starts Nov 2007

* As of publication date; see BOC website for up-to-date schedule information (www.theBOC.info)

California – Level II —— www.theBOC.info/ca
San Jose ..... May 1 - Oct 9, 2007
Port Hueneme..... Starts Sept 2007 ***(Sold out)***
Downey .....Starts Sept 2007
San Francisco .....Starts Oct 2007

Oregon – Level II ———— www.nweei.org
Portland ..... Apr 2007 - Sep 2007

Washington – Level I — www.theBOC.info/wa
Bellevue..... Starts Apr 12, 2007
Tacoma ..... Starts Sep 18, 2007
North Seattle..... Starts Oct 4, 2007

Washington – Level II – www.theBOC.info/wa
Olympia ..... Starts May 24, 2007
Everett.....Starts Sept 12, 2007

WASHINGTON———— **Continuing Ed**
BOC 212: Water Efficiency for Building Operators
Renton .....Mar 8, 2007