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An Intelligent Retrofit

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What you need to know before you buy LED lamps

LED lighting is going to change the world as we know it. Energy and maintenance bills will go down, and the quality and flexibility of lighting will improve. From a design standpoint, the unique characteristics of solid-state lighting—the small size, vibrant colors and color mixing—will open a cornucopia of options.

The evolution of today's LED lamps parallels the rise of the personal computer in the 1990s. Research, competition and consumer demand are fueling this fast-changing industry, and the result is higher efficiency and increased performance matched by a dropping price point. The Department of Energy estimates that by 2015, the cost to manufacture LED devices (the LED chips) will drop by approximately 80 percent, meaning today's $100 lamp will cost about $20.

A Brave New World of Lighting

This is all very exciting for the lighting-intensive restaurant industry, but, like all brave new worlds, this one comes with its own perils. Understanding the market and knowing the strengths and weaknesses of solid-state lighting is the best way to get a good-looking and costeffective lighting package. The SSL industry is so new, and is changing so quickly, that most of the standards regarding color rendering, lifespan, thermal and electrical connections, electrical drivers, binning (sorting the LEDs for consistent color) and safety are either still in the works or were just completed in 2010.

Combine this with the gold-rush mentality that is part of any new industry, and you end up with a risky proposition for the uninformed buyer. Fortunately, the Department of Energy has stepped in to bring standardization and unbiased testing to the SSL industry and to provide guidance to consumers.

Staying Informed

One way the DOE is bringing knowledge to the industry is through their Commercially Available Light-emitting Diode Product Evaluation and Reporting Program, or CALiPER. Started in 2006, this initiative involves purchasing and testing of a wide sample of SSL products. The results of the labwork include both detailed reports on individual SSL products and periodic summary reports. The DOE sums up the need for this testing in the opening paragraphs of its October 2010 report: "SSL technology and market-available products have improved dramatically in the past three years, yet there is still a wide disparity in quality among different products and manufacturers and, in many cases, wide disparity between manufacturer's claims and the actual performance of their SSL products.

"SSL products are evolving quickly, and the lighting market is constantly seeing the arrival of new products for every lighting application. With this rapid evolution and relatively immature market come risks for buyers and specifiers—not all products perform as claimed, not all products are appropriately designed for a given lighting application and not all products are as reliable as suggested by marketing literature."

A consistent theme emerges when reading the CALiPER reports: many manufacturers over-represent the performance of their products or get key elements, such as color temperature and light distribution, wrong. That is not necessarily out of malice on the part of the manufacturer—not many folks have a DOE-qualified lighting lab—it's more of a reflection of the lack of standards, evolving technology and perhaps some over-enthusiasm on the part of the sales force.

Buyer Beware

Much of the CALiPER testing is based on an Illuminating Engineering Society standard know as LM-79. The DOE report includes a strong warning to the prospective SSL customer: "...Obtain LM-79 test reports for the SSL products under consideration and compare them to your requirements."

If a manufacturer does not publish performance results for an SSL product from LM-79 testing conducted by a qualified laboratory, the product should not be considered for purchase until those standardized performance metrics are provided. And they go on to qualify that statement: "Without using LM-79 results to determine the adequacy of an SSL product for a given application, chances are very high that the product will not meet manufacturer performance claims and the customer will be dissatisfied."

If reading detailed technical reports is not on the menu, then the best way to get up to speed on solid-state lighting is to subscribe to the excellent weekly blog posts from Jim Brodrick, lighting program manager for DOE. Short, to-the-point and up-to-theminute, these posts summarize much of the CALiPER results and give the reader an eye on the LED market issues.

As the home page says, "The fast pace of solid-state lighting technology and market developments often renders last month's news obsolete, so interested readers should stay tuned on a weekly basis." Sign up for the weekly e-mail and archives of all the existing postings can be found at www1.eere. energy.gov/buildings /ssl/postings.html.

Getting Informed

Knowing how the SSL market is structured helps to explain some of the challenges for the consumer. Once again, the analogy of the PC market is useful.

The light-emitting diodes in LED lamps are created by a handful of manufacturers, including Cree, Osram, Phillips and Nichia. These diode "packages" are then bought by the lamp and fixture manufacturers, which combine them with power supplies, heat sinks and optics to create a finished product.

This is similar to the way that PC makers buy central processors from chip companies like Intel. The quality of an LED package is very important, but the way it is used is even more vital.

Heat sinks and power supplies are crucial to the life and performance of a good PC, and the same is true for SSL. The highestquality diodes will fail early if they get too hot, are connected to an out-of-spec voltage or get fed an uneven current. And while a manufacturer might promise a 50,000-hour lifespan for their LED lamp, based on the diode package, the lamp will not last that long unless it's part of a well-engineered system.

The same is true for the efficacy (efficiency) and lumen (light) output of the lamp. The LED package, by itself, has a rated lumen output and efficacy (lumens-per-watt). But what's really important to the buyer is the efficacy of the whole lamp or fixture, not just the LED package. Performance of the purchased lamp or fixture is influenced by design, optics and how well the heat sinks work, and it can be very different from the LED package specs.

This is why finding the right manufacturer is crucial to the purchasing decision. Basically, anyone with a business card, a handful of LEDs and a little know-how can become a manufacturer. There are plenty of SSL purveyors selling products that will not live up to expectations or that are not practical to begin with. But, the good news is that there also are plenty of quality manufacturers with excellent products that are market-ready and cost effective.

Forming a Partnership

Just like during the early days of the Internet, some SSL purveyors will rise to greatness, and many will not make the cut. This is where relationships come into play. If you are looking at a major LED retrofit, work with a manufacturer, try out their products and perhaps even create specific lamps for your needs.

A quality manufacturer should be flexible, have an understanding of the unique needs of foodservice and demonstrate a willingness to meet those needs. They also should have a quality warranty program and the depth to make good on warranty claims. Remember, these lamps are supposed to last 30,000 to 50,000 hours; that's four to seven years of operation at 20 hours a day.

Bill Stauffer is the vice president of sales and co-founder of Eco- Story, a company that just completed a major LED installation in 827 Brinkers restaurants.

"We have done many large national LED roll outs dating back three years now, and most of these face one challenge or another," he said. "So it is important for customers to choose a company that will be flexible in manufacturing an LED solution specific to their needs and a company that will be around to support the installation and warranty claims."

In a few short years, solid-state lighting will be the norm; all this dust will have settled and people will look back on incandescent lighting as a quaint 19th-century technology. But, during the transition period, the market looks a little like the Wild West. Get educated, purchase wisely and walk away with the best deal.

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