LED WATCH

James Brodrick

IS YOUR DESIGN ALREADY OUT OF DATE?

Some ideas for guarding against LED obsolescence

Last year, the Burden Museum in Troy, NY, switched over to all-LED lighting with the help of the U.S. Department of Energy's (DOE) Gateway demonstration program. By the time the conversion was implemented, 14 months had elapsed since specification, so a number of changes had to be made. One of the specified products had been withdrawn from the market because it had been having field problems, so another product had to be found to take its place. Plus, the manufacturer of the track lighting had decided not to make screw-based incandescent trackheads anymore, which necessitated changing to a dedicated LED trackhead instead of using LED retrofit lamps. In addition, one of the strip lights was no longer available, so the lighting designer chose a different brand that had a different transformer/driver—which meant that most of the dimming circuits had to be reevaluated for compatibility and load, and many needed an interface module. All of these complications added to the cost and labor impact, to say nothing of the hassle factor.

The experiences at the Burden Museum are not atypical and illustrate an issue that's of huge concern to lighting designers and specifiers—namely, how to deal with the fact LED technology has been improving at a pace so rapid that it can outstrip long lead times for new construction and major renovation. To address this challenge, DOE convened a panel of experts at its ninth annual Solid-State Lighting Market Development Workshop in Detroit a few months ago. Its focus was on what specifiers and manufacturers can do to ensure that products are as "future-proof" as possible.

Panelist Scott Hershman of LF Illumination, which manufactures luminaires, remarked that the limited lifespan of conventional light sources has required them to be a replaceable component separate from the luminaire, but that the coordination required to produce an LED light fixture has forced luminaire manufacturers to assume the role of source provider. Of course, with LEDs, the chip is just the starting point and one part of a whole system that also includes the heat sink, the driver and the optical train. Hershman noted that in the laboratory, LEDs have already achieved their theoretical cost-effective maximum efficacy for white light—somewhere between 260 and 300 lumens per watt, which means that within the next few years, the rate of efficacy increase will start to plateau.

To help ensure that LED lighting products are not rendered obsolete by newer generations in the interval between specification and installation, he offered manufacturers a number of suggestions, such as making components replaceable, making parts traceable (e.g., with bar codes) and ensuring an upgrade path. In addition, Hershman cited the need for more regulations and standards—especially those that will allow for the interchange of components between manufacturers.

MORE STANDARDS

Panelist Jim Yorgey of Lutron Electronics, a controls manufacturer, made the point that because there are

interchangeability issues between dimmers and LED loads, they need to be designed in concert as a system. He observed that dimming capability varies widely, depending on the LED driver and the dimmer. For example, an LED marketed as "dimmable" may dim to only 50 percent of its full output, which is suitable for a limited number of applications; or it may dim to 20 percent of its output, which is suitable for a lobby or office, for example; or it may dim all the way down to 1 percent, which is what's needed for a restaurant or media room.

There are multiple dimming protocols and hardware options, both wired and wireless. Yorgey noted that wireless is trending, but there's no clear dominant technology, and there is no one wireless lighting controls standard to force a narrower selection of options or interoperability. He called for standards bodies such as IES, the National Electrical Manufacturers Association (NEMA), the Connected Lighting Alliance and the International Electrotechnical Commission to develop performance- and compatibility-based standards quickly—and for industry to create a third-party testing process that qualifies performance and certifies conformance to those standards.

Ideally, Yorgey said, manufacturers would provide standard ranges of electrical characteristics for LED modules, field-tunable drivers that can change over time, and controls that adapt to the interchangeable modules, following line and low-voltage control standards. NEMA's standard SSL7A is a step in this direction.

Yorgey emphasized that designers must understand the process and exert due diligence throughout the construction documents and construction process to ensure final project quality, while contractors and installers need to understand the compatibility issues and work with the design and engineering team and manufacturers. They may need to hire specialists to integrate the controls, supervise installation and do the final programming.

Panelist Brienne Willcock of Illuminart, a lighting design firm, pointed out that because of the many variables and a lack of standards, there are no true "equals" for LED lighting products, which makes three-name specifications impossible. She noted that not all manufacturers offer replaceable LED system components, and that few have taken a serious look at sustainability issues such as recyclability and disposal.

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Willcock made a number of recommendations for industry, calling for component and dimming standards, as well as interchangeability of components, and also citing a need for communication between the chip, driver and controls so that they can adapt to each other. In addition, she urged manufacturers to produce adaptive or tunable drivers that can accommodate a wider range of LEDs. Willcock advocated adding a controls integrator to the construction process, as well as changing the design process, construction process and design fee structure to accommodate the intensive compatibility work that has to be done up to three times—i.e., during the design documentation phase, at bid time and again at product order time.

While no one wants to slow the pace of improvement we're seeing in LED lighting, at the same time, no one wants to specify products that become obsolete before the full return on investment is achieved. The panelists offered instructive advice on how to walk that delicate line between those two extremes while the technology continues to mature.

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