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When Other Concerns Outweigh Energy Efficiency

Although SSL is best-known for its potential to save energy, the technology has many other advantages as well, and in some real-world applications, these may far outweigh energy efficiency in terms of their importance to end users. A good case in point is a recent [GATEWAY](#) evaluation at the University of Maryland's Clarice Smith Performing Arts Center (CSPAC) in College Park, where reducing maintenance costs while retaining the quality of the light were the primary concerns — with energy savings considered icing on the cake.

As described in a [new report](#), the UMD project involved replacing the 87 halogen lamps in the existing wall washers with LED modules. Located in hallways lining CSPAC's atrium, the wall washers — which operated for 7,300 hours per year — provided task illuminance for transitioning between spaces and also lent visual interest to the atrium boundaries. However, those halogen products required continual maintenance, including not only frequent re-lamping, but also re-aiming of re-lamped fixtures to maintain the desired distribution of light on the walls. This maintenance was made more difficult by ceilings that were as high as 41 feet, with one area over stairs requiring a scissor lift and scaffolding to service the lights. The melting of the supply-conductor insulation in some of the halogen wall washers was an additional concern.



That's why the primary goal of the retrofit project was to reduce maintenance costs, while preserving the visual appearance of the space. It was expected that an LED solution would reduce those costs, not only because of longer product life, but also because in producing considerably less heat than halogen lamps, the LEDs were unlikely to melt the insulation. So in the spring of 2014, UMD facilities

management considered all known LED alternatives before mocking up the two most financially feasible options: a complete LED wall washer and a retrofit of the internal components of the existing wall washer with an LED module.

The mockups provided an opportunity to visually evaluate light distribution, glare, color, dimming behavior, and flicker. Many of those factors were unfavorable for the LED wall washer, so the LED module — which cost less, delivered the desired quality of light, and was easier to install — was selected as the best solution, and the retrofit was completed in March 2015. The fact that the LED modules brought approximately 80% energy savings compared to the halogen wall washers was viewed as an added bonus.

Wall washing is one of the more difficult lighting applications, for two reasons: first, because when illuminating a plain, smooth wall such as that of the CSPAC atrium, any change in color is easily noticeable, thus making color consistency an important consideration; and second, because a frequent goal of wall washing is to create a smooth gradient, which makes distribution of light on the wall a challenge and typically requires that the luminaires be specifically designed for that. In CSPAC's incumbent wall washers, the desired light distribution was accomplished with reflectors that were designed for tubular halogen lamps, but those reflectors were blocked by the LED modules. However, the mockups showed that the LED modules — being directional sources — could nevertheless produce a distribution that was visually similar to that of the halogen lamps in the existing wall washers.

When all was said and done, the LED modules performed as hoped, providing an acceptable quality of light while cutting down substantially on maintenance costs. Some minor visual changes — including a decrease in the amount of light reaching the walls and floor — were noted after the retrofit, but they were considered acceptable, and the illuminance in the hallways still met Illuminating Engineering Society of North America recommendations. There was noticeable flicker, but it was considered acceptable for this particular application, and some changes that were noted in the color appearance of the light served as a reminder of the care that must be taken when ordering products.

As the efficacy and lifetime of LED technology continue to improve, more demands are being placed on the visual appearance of the light. The visual appearance is a concern for many retrofits, even when maintenance or energy efficiency is the primary concern, because changes in appearance may entail a lengthy approval process. If the quality of light delivered by a new luminaire is similar to that produced by the incumbent product, the retrofit process can often proceed more quickly.

As of the writing of the GATEWAY report, all of the installed LED modules were operational and required no maintenance, which means that the hoped-for benefits of the retrofit are already being realized — while, on top of all that, energy

is being saved. Small wonder that UMD facilities management is pleased and continues to initiate LED retrofit projects across the campus.

For more details on this GATEWAY demonstration, please see the full report, which is available online at <http://energy.gov/eere/ssl/gateway-demonstration-indoor-projects>.

As always, if you have questions or comments, you can reach us at postings@akoyaonline.com.