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ARCHITECTURAL LIGHTING

INSIDE: LIGHTSCAPES AT THE VENICE BIENNALE • BLUE LIGHT HAZARD • DEVELOPMENTS IN SPORTS AND ARENA LIGHTING • ONE-ON-ONE: LIGHTING DESIGNER ROGER NARBONI

THIRTEENTH ANNUAL LIGHT & ARCHITECTURE DESIGN AWARDS

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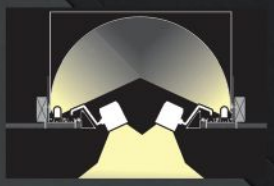

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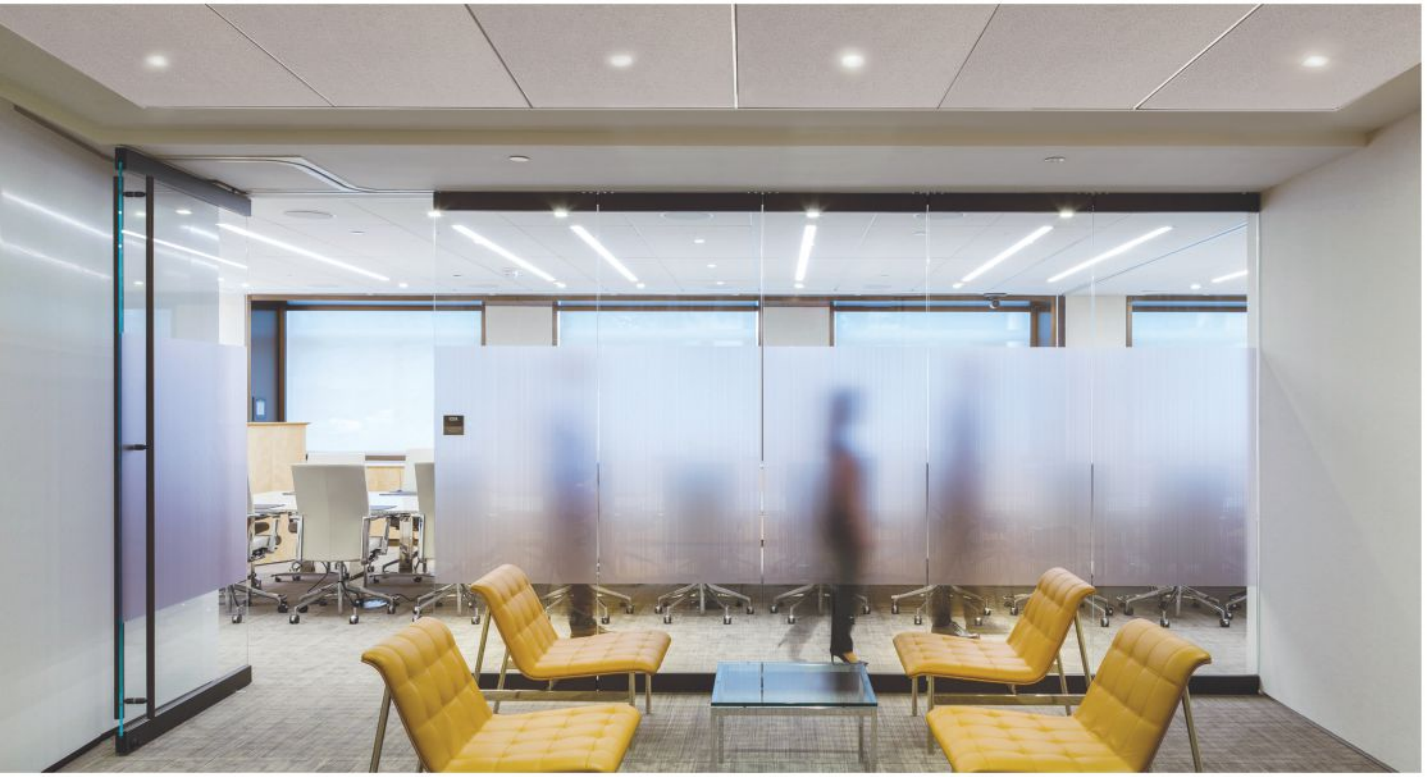

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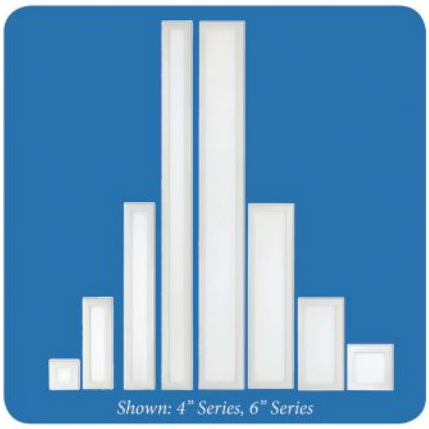

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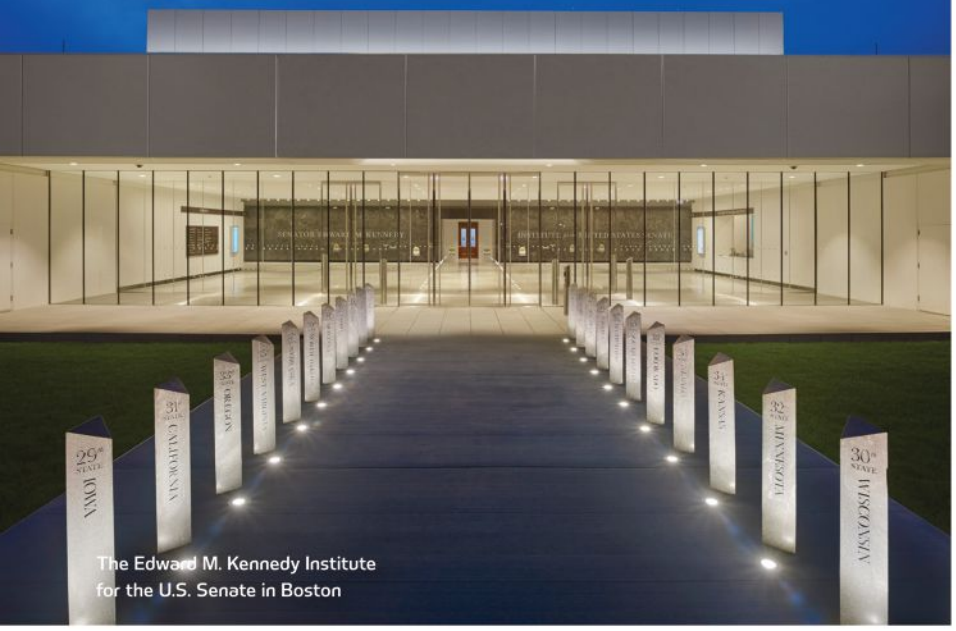

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On the Cover: The entry gallery for "Manus x Machina: Fashion in an Age of Technology" at the Metropolitan Museum of Art, New York; Photo: Brett Beyer

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CAN LIGHTING'S PAST BE SAVED?

Stephen Voss

As we go to press, the Four Seasons Restaurant in the Seagram Building in New York City has recently served its last dinner and its furnishings are currently being auctioned off. The iconic restaurant, which opened in 1959, is set to move to a new location, a few blocks away on East 52nd Street at Park Avenue, according to the restaurant owners Julian Niccolini and Alex von Bidder. But the Four Seasons as so many knew it, the preferred power lunch location of New York's rich and famous, will be a thing of the past. (A new restaurant is proposed for the space but its design and how it will incorporate the landmarked elements of the interior has not been released.)

It's a true shame, for the restaurant's interior was not only a stellar example of modern design, it was also one of the last existing examples of lighting designer Richard Kelly's work. Kelly's three main principles of lighting—focal glow, ambient luminescence, and play of brilliants—were on display inside the Four Seasons in a tour de force, with the gridded ceiling of downlights, the four uplight trees that anchored the pool in the center of the space, and the shimmering aluminum-beaded curtains at the windows.

Watching the saga play out over the past several years in the New York press has been frustrating, and one wonders why Aby J. Rosen, the Seagram Building owner, could not realize the value of keeping a signature interior in place alongside other iconic artworks such as the Picasso tapestry *Le Tricorne*, which hung in the lobby and was selected specifically for the building's interiors and installed in 1959. (The tapestry was acquired by the New-York Historical Society and moved out of the Seagram in 2014.)

And while the architecture community was vocal throughout this debate, the lighting community appeared silent. I wonder, if the lighting community had joined the conversation, could they have helped further the case that the restaurant was of design significance beyond its architectural merits? This is not the first time I've addressed the issue of preserving lighting's past. In our Nov/Dec 2014 issue, I wrote about this topic and was disappointed not to have received any feedback from the lighting community on this issue.

So how can we go about preserving lighting's past? Can we, or is it too difficult a task, knowing that the lighting life cycle of a project operates according to a different timeline than a building and must more regularly adapt to new code requirements and lighting technology evolutions?

Regardless of the answer to that question, never has there been a more critical time to take this issue seriously. The current young generation of lighting designers has no reference point when it comes to historical precedents or what it was like to practice lighting design in a non-LED world.

I would like to see the IALD and IES come together on this. It's not an issue of professional affiliation but of preserving the legacy of the professions' practitioners. Further, there should be a greater emphasis on offering courses at both the degree level and continuing education level on lighting design history. Both practitioners and industry members have to be reminded that the history of lighting design is equally as important as the history of light sources and technology. Lighting's design legacy needs to be reinforced along with its technical achievements.

Richard Kelly had the great respect of his architectural colleagues of the day, such as Ludwig Mies van der Rohe, Philip Johnson, and Eero Saarinen. If today's lighting community wants to cultivate respect on the same scale and be seen on equal footing with design colleagues—as we continuously speak of doing—then the lighting community needs to step forward and map out a plan here. Without respect for one's own past, how can others be expected to show concern?

Elizabeth Donoff
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Anja Thierfelder

(UN)NATURAL WONDERS

"Lightscapes," a collaboration between Stuttgart-based Transsolar KlimaEngineering and architect Anja Thierfelder, explores the natural phenomenon known as crepuscular rays, or sunbeams, which occur when direct sunlight is blocked by clouds and the rays are scattered by atmospheric microparticles such as dust or haze. Making their idea a reality required knowing how to modulate the space's thermodynamic conditions, and to do so the team developed a high-pressure nozzle system to control humidity, temperature, and air movement. The shafts of light in the photo above appear to be coming through skylights even though there aren't any in the space. In reality, those rays are the work of 20 spotlights casting their beams diagonally across the dark interior to create a dialogue of light and shadow with the existing architecture. "Lightscapes" is on view through Nov. 27, at the Arsenal complex, as part of the 15th International Architecture Exhibition—La Biennale di Venezia. •

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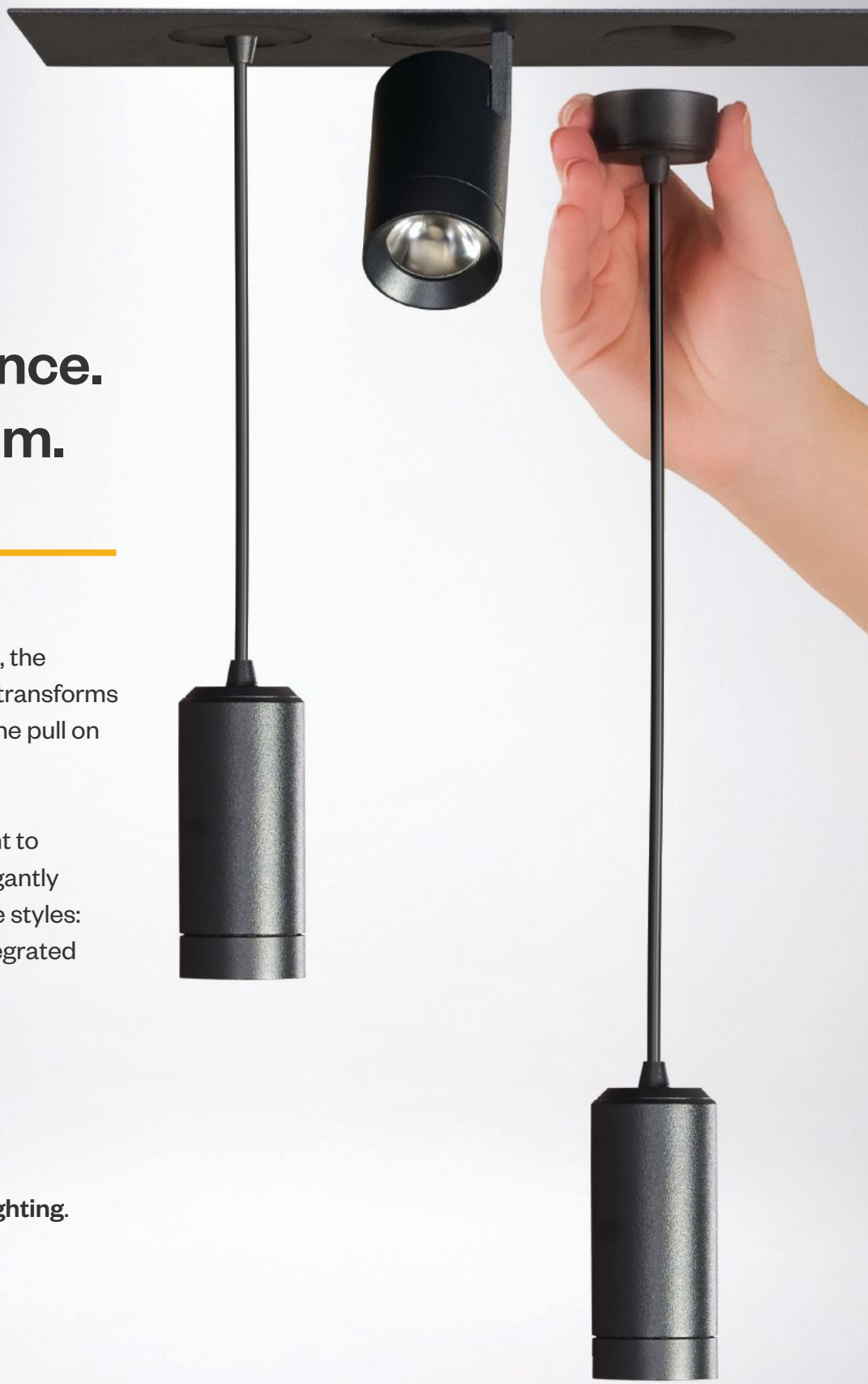

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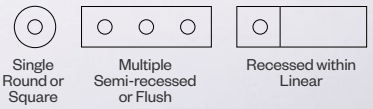

ELECTRIC ICON

The illuminated Citgo sign in Kenmore Square is one of the Boston skyline's defining features. Since its installation in 1965, its red triangle, blue letters, and white background have served as a reference point for residents and visitors alike, but it has never been granted landmark status. That might be about to change. The 60-foot-square sign, which originally used neon and was retrofitted with LEDs in 2010, is being advanced for landmark review. The City Council voted in favor of initiating the process. And none too soon. The fate of the sign has been in question the past several months. The building it stands on, 660 Beacon, is owned by Boston University, which has plans to sell it. But before that can happen, the Boston Landmarks Commission will study the sign's historic and architectural significance, which should be easy to determine since, as *The Boston Globe*'s architecture critic Robert Campbell once noted, the sign is "the crown jewel of the Boston skyline." •

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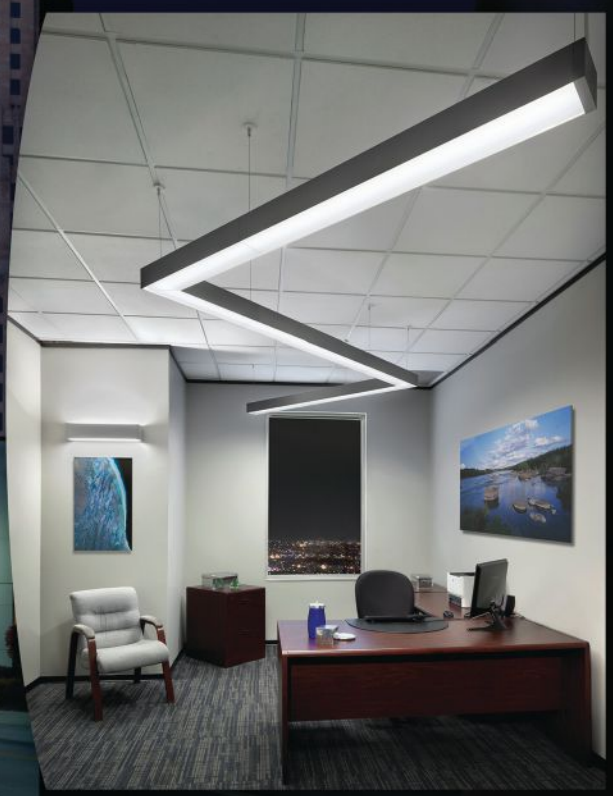

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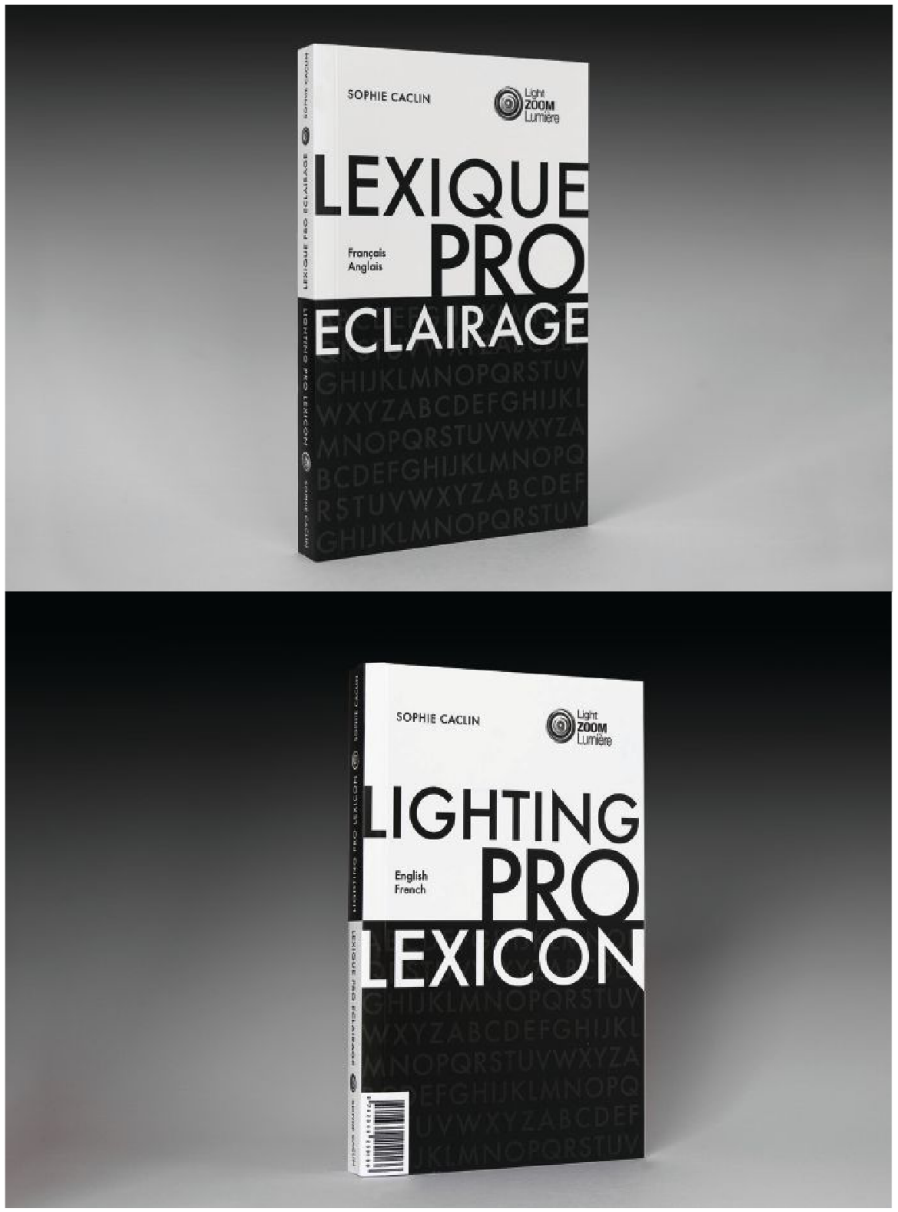

Philippe Gallezot

PARLEZ-VOUS ÉCLAIRAGE?

Ever wonder how English lighting vocabulary translates into French? Look no further than Sophie Caclin's *Lexique Pro Éclairage/Lighting Pro Lexicon* (Éditions Light Zoom Lumière, 2016), which has 1,400 lighting-related words and terms presented in a handy, pocket-sized, bilingual glossary geared toward design professionals. All of the entries are organized alphabetically in French and English (just flip the book over for the language you need) and a thematic index at the front, provides a reference to terms based on lighting applications. Available for purchase at *editions.lightzoomlumiere.fr*. •

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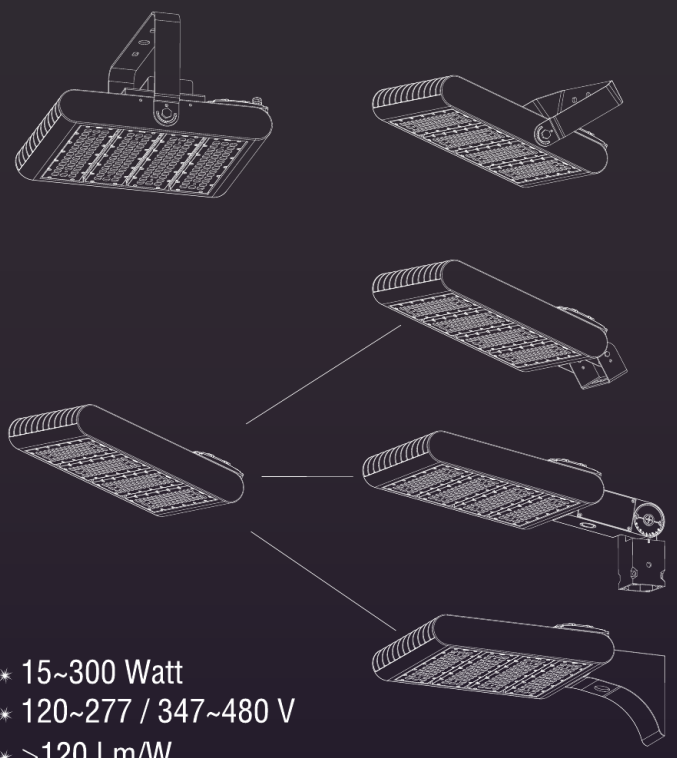

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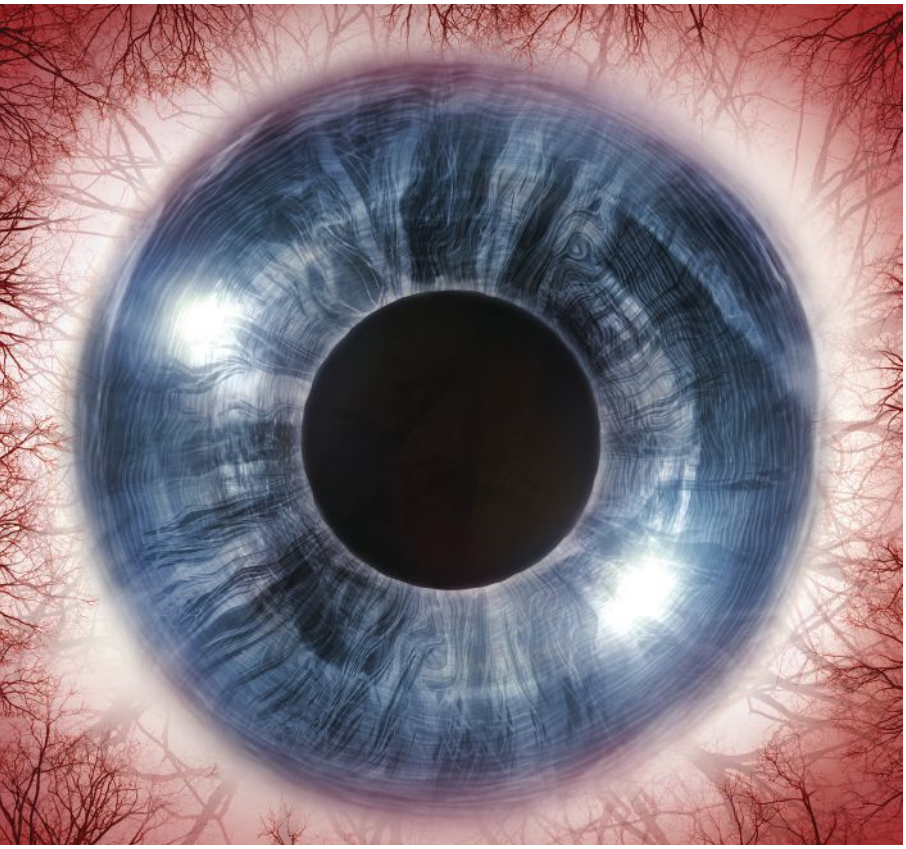
BLUE-LIGHT HAZARD AND LEDS: FACT OR FICTION?



Ezume Images

The advent of solid-state lighting in everyday applications has renewed research interest in whether its spectral profile can lead to increased health risks.

text by Alice Liao

Little is certain about the health implications of long-term exposure to LED lighting, but the proliferation of phosphor-coated white LEDs in everyday applications has sparked a renewed interest in research. Recent investigations have centered on the spike in the short-wavelength blue region of LEDs' spectral power distributions (SPDs). Studies in disciplines outside of lighting have linked exposure to everything from circadian disruption to blue-light hazard, the latter of which this article will focus on. But should the general population be alarmed? Not really, say the lighting experts.

THE HAZARDS OF BLUE LIGHT

Blue-light hazard was discovered in the field of occupational health and safety in the 1970s, predating the invention of white LEDs. The term describes the acute photochemical damage to the retina caused by "staring at an intense light source," such as a welding arc or the sun, says David Sliney, chairman of the IES Photobiology Committee. The radiation absorbed by the retina unleashes a series of chemical reactions that can lead to retinal inflammation, cell death, and white lesions within a day or two of exposure.

Research conducted over the last 40 years in medical academia has connected these phototoxic responses to short-wavelength radiation in the range of 400 to 500 nanometers—with a peak around 440 nanometers—prompting speculation about the safety of blue-rich light sources used in general illumination. Fluorescent sources also faced scrutiny for the blue peak in their SPDs, but as John Bullough, director of the Transportation and Safety Lighting Programs at the Lighting Research Center (LRC) in Troy, N.Y., explained in the *Journal of the Illuminating Engineering Society* in 2000, their low luminance makes any potential for risk of blue-light hazard "negligible."

Photochemical damage from blue light exposure has also been implicated in age-related macular degeneration (AMD), a leading cause of vision loss in people over 65. Biomedical researchers suspect that long-term exposure to short-wavelength blue light can create oxidative stress on retinal cell structures, resulting in the accumulation of lipofuscin, a lipid-containing waste product that has been attributed to AMD.

WHY SO BLUE?

Typical white LEDs consist of gallium nitride (GaN) and blue dye and a phosphor coating that converts a portion of the blue light into white.

These phosphor-coated white LEDs can be fabricated with customized spectral profiles, but the process necessitates a spike in blue radiant energy. The phosphors produce a second, broader, and, in some cases, higher peak between 550 and 650 nanometers.

LEDs with correlated color temperatures (CCTs) topping 3000K are often singled out for their high blue content. In June, for example, the American Medical Association released a report cautioning against the use of high-CCT LEDs in outdoor applications, citing health concerns such as melatonin suppression and circadian disruption—which are technically distinct from blue-light hazard. Although CCT does correlate with a source's blue-light content, the U.S. Department of Energy (DOE) states in its 2013 "Optical Safety of LEDs" fact sheet that the proportion of blue emissions in the spectrum "is not significantly higher for LEDs than it is for any other light source at the same CCT."

The brightness of LEDs has also raised concerns. As a point source, the diodes emit a concentrated directional light that can be unpleasant to view directly. Still, their output is less than what the DOE cites as a risk for blue-light hazard: a luminance exceeding 4 gigacandela per square meter, and an illuminance exceeding 400,000 lux. Moreover, in interior lighting applications, the sources are often diffused, mitigating any discomfort.

STUDIES IN BLUE

The 1976 *Nature* article "Retinal Sensitivity to Damage from Short Wavelength Light," by William Ham Jr., Harold Mueller, and David Sliney continues to be the go-to reference in contemporary research on blue-light hazard and AMD. Undertaken to differentiate between thermal and photochemical injuries caused by short-wavelength light, the study established minimum thresholds for damage by irradiating the retinas of anesthetized monkeys with lasers at wavelengths between 442 nanometers and 1,064 nanometers. Exposure periods ranged from 1 second to 1,000 seconds.

In his literature review, Bullough notes that the researchers determined "light at 442 nanometers was 100 to 1,000 times more damaging than energy at 1,064 nanometers" and that the lesions produced by the former seemed chemically induced while those inflicted by the latter were burns. This and a subsequent study by Ham formed the basis for the safety guidelines by the International Commission on Non-Ionizing Radiation Protection on protection against laser radiation, as well as for *ANSI Z136.1-2007: American National Standard for Safe Use of Lasers*.

Similar laboratory experiments also observed photochemical retinal damage associated with intense short-wavelength radiation. In a 2011 literature review in *Photochemistry and Photobiology*, Dutch researchers Dirk van Norren and Theo G.M.F. Gorgels examined 56 such papers, the most recent of which were published in 2009 and 2010, involving the directing of light from multiple sources into the retinas of live monkeys, rats, rabbits, or squirrels for a period of time, ranging from one second to five hours.

Extrapolating lighting recommendations from research can be tricky. In the 2014 post "Blue Light Hazard … or Not?" on the blog *All Things Lighting*, Ian Ashdown, chief scientist for Lighting Analysts and president of Vancouver-based ByHeart Consultants, notes that the light intensities used in much of the research to date were often too high to be instructive in determining health risks from long-term exposure. While the studies demonstrate that "both ultraviolet and blue light can permanently damage the retina if focused onto a small spot," he says in an email to ARCHITECTURAL LIGHTING, "the exposure time necessary to do damage was equivalent to staring at the tropical noonday sun for 15 minutes without blinking."

"The exposure time necessary to do damage was equivalent to staring at the tropical noonday sun for 15 minutes without blinking."

–Ian Ashdown, chief scientist, Lighting Analysts, and president, ByHeart Consultants

THE PROBLEM OF PINPOINTING LEDS

Excessive light levels have plagued similar studies on LEDs. In "Photoprotective Effects of Blue Light Absorbing Filter Against LED Light Exposure on Human Retinal Pigment Epithelial Cells In Vitro," published in 2013 in the *Journal of Carcinogenesis & Mutagenesis*, the researchers subjected cultured, human retinal cells to intensities of 5mW per square centimeter of white, blue, green, and red LED light in three 12-hour on–off cycles, with and without a blue-light-absorbing filter. Although the filter

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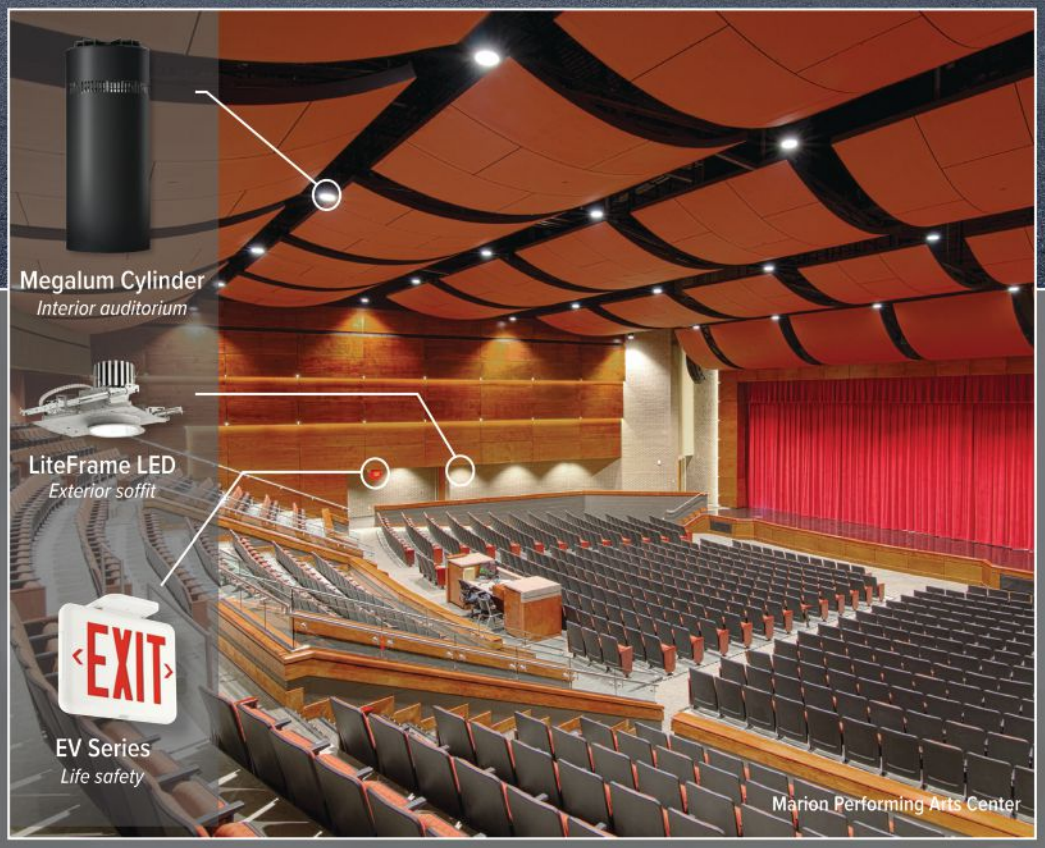

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did prevent phototoxicity from LED lighting, Ashdown says that the light exposure used on the cells was "hundreds of times more light than the human retina would be exposed to from LED light sources." Moreover, because the experiment was done with cultured cells, it did not factor in the ability of a human's "biological system" to repair cellular damage.

Even when researchers have attempted to approximate real-world applications of LEDs, a lack of lighting expertise has led to uncontrolled experimental conditions. In a 2014 paper in *Environmental Health Perspectives*, researchers exposed albino rats in cages to light from a blue LED, 6500K white LED, a 3000K yellow compact fluorescent lamp (CFL), and 6500K white CFL in 12-hour on–off cycles for up to 28 days. Although the light sources had verified SPDs and intensities, they were set 20 centimeters away from the rats and measured for 750 lux, exposing the rats to "completely different levels of blue light," Ashdown says. Furthermore, the light levels far exceeded what the rodents, which have light-sensitive retinas, encounter in reality. While blue-light-induced retinal damage was found, he notes, this study was flawed.

In fact, Ashdown, who has studied solid-state lighting and its impact on human vision since 1999, says that not one academic paper associating blue light with retinal injury "presents credible evidence that light levels encountered in everyday life will cause retinal lesions."

The real issue, says Robert Clear, a retired staff scientist with Lawrence Berkeley National Laboratory and a sitting member of the IES Roadway Lighting Committee, is that this topic requires "an intersection of two sets of expertise. The people who are knowledgeable in biology are generally not familiar enough with lighting to be able to evaluate it."

In epidemiology, the findings are even slimmer. Few studies have demonstrated the health effects of long-term exposure to blue light or yielded evidence of a connection to increased risk for AMD. "Maybe one out of 20 will show there's a possible linkage," Sliney says. An often-cited example is Hugh Taylor's study of 838 Chesapeake Bay fishermen chronically exposed to sunlight, published in *Transactions of the American Ophthalmological Society* in 1990, which found only a marginal association.

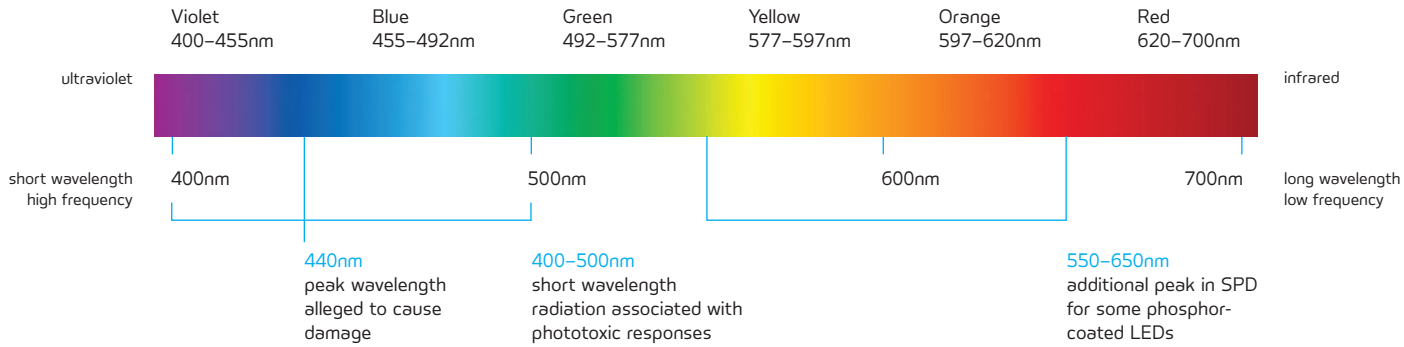
GOING BEYOND BLUE-LIGHT HAZARD

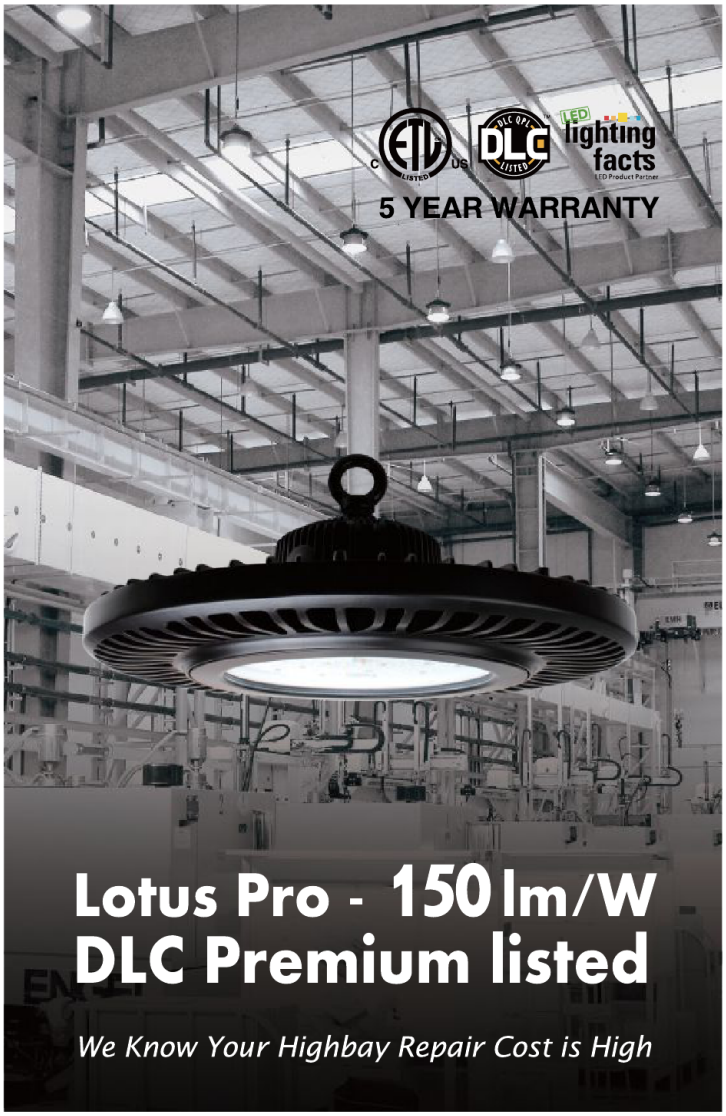
Considerable research has focused on the impact of short-wavelength light on the eye's functions unrelated to vision, such as melatonin and circadian regulation. Although light exposure in general can inhibit the release of melatonin, the hormone that signals to the body the onset of darkness or night, studies have shown that blue light seems to exert a more powerful effect. For example, boosting light levels and color temperature for 30 to 45 minutes has helped astronauts feel more awake, says Stan Walerczyk, principal of San Francisco–based Lighting Wizards, an energy-efficiency consultancy.

Other evidence suggests that nocturnal use of LED-lit mobile devices and computer displays, which emit a bluish cast, can delay sleep. Walerczyk recommends avoiding "blue light one to two hours before you go to bed." For those who can't stay away from their screens, free apps such as F.lux will increase and decrease the blue component in an electronic display according to the time of day, he says. Apple also offers a "night shift" option in its mobile devices that casts a hue atop screens during evening hours.

In outdoor applications, such as street lighting, LEDs with higher amounts of blue light could potentially suppress melatonin production,

VISIBLE LIGHT SPECTRUM





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as the June AMA report alleges. However, the DOE and the LRC, in their responses to the AMA report, note that any conclusions to be drawn need to factor in the amount and duration of light exposure.

AVOIDANCE STRATEGIES

Despite the vast amount of research conducted on blue-light hazard and other blue-light-related health issues, much remains unknown about the health implications of the chronic exposure to LED light at levels encountered in daily life. However, based on a host of current international standards, such as *CIE S 009-2002: Photobiological Safety of Lamps and Lamp Systems*, the DOE has found no risk of blue-light hazard in LEDs or any other source used in general lighting applications.

All of this is not to say that the brightness of LED lighting and its blue content pose no harm to certain segments of the population, such as infants who might not avert their eyes frequently enough from light sources, and people with AMD and other eye disorders.

For the general population, Walerczyk says, "it is important to have sufficient 460 to 490 nanometers—which some people just call 480 nanometers—of light most of the day." The best way to check an LED light source's blue emission, SPD, and light output, he says, is to invest in a spectrometer and "skip CCT and CRI." •

SELECT RESOURCES

"The Blue-Light Hazard: A Review," by John Bullough, *Journal of the Illuminating Engineering Society*, 2000. Available at bit.ly/29WUxt4.

"Optical Safety of LEDs" fact sheet, U.S. Department of Energy, 2013. Available at bit.ly/2aex1Y8.

"Retinal Sensitivity to Damage from Short Wavelength Light," by William T. Ham Jr., Harold A. Mueller, and David Sliney, *Nature*, 1976. Available at go.nature.com/2a3CoHF.

"White Light-Emitting Diodes (LEDs) at Domestic Lighting Levels and Retinal Injury in a Rat Model," by David Sliney, *Environmental Health Perspectives*, 2014. Available at bit.ly/2ayoRG3.

"SSL Postings: LED Street Lighting," by the U.S. Department of Energy, June 21, 2016. Available at bit.ly/29Zzfpl.

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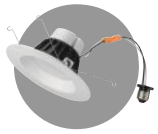

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Luminaire manufacturer Eaton's Ephesus Lighting business retrofitted the Bridgestone Arena, in Nashville, Tenn., with LED fixtures in 2015.

John Russell

LEDS SHED NEW LIGHT ON SPORTS

Solid-state lighting is making inroads in professional stadiums, redefining the fan and player experiences.

text by Hallie Busta

When the Mercedes-Benz Superdome, in New Orleans, went partially dark with 13 minutes and 22 seconds to go in the third quarter of the 2013 Super Bowl, fixing the defective relay in the metal halide high intensity discharge (HID) system used in the stadium's main overhead lighting accounted for only a portion of the half-hour delay. Power was restored after a few minutes, but the fixtures took much longer to reach full brightness—and only then could play resume.

The U.S. Energy Information Administration reports that metal halide HID luminaires can take up to 20 minutes to reach 90 percent brightness, compared to LEDs' near-instant on/off functionality. Although HID fixtures are the

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most common overhead luminaires used in open stadium and indoor arena lighting applications today, their prevalence is being challenged by the rise of solid-state technology as professional, university, and even community stadiums and arenas increasingly play host to more than just sporting events, expanding their repertoire to include concerts, conferences, and even retail and dining. The result is changing the very nature of live sports for stadium owners, the fans, and, of course, the players.

How might the situation in New Orleans have played out with today's LEDs? "Would it have still happened? Probably," says Jay Wratten, a senior associate for lighting design at WSP | Parsons Brinckerhoff in Boulder, Colo. "But it would have been a commercial break, not a 30-minute delay."

IMPACT: THE OWNERS

Professional arenas began making the switch to LED long before stadiums because they are illuminated year-round for games and events to expedite the investment's payback period; a large, open stadium with metal halide, on the other hand, may only use light for a few hundred hours each year because the system is so costly to run. As LED costs trend ever lower and their performance improves, facility managers are looking to the technology for features like color tunablity and fixture control that offer customization, allowing the space to be used for more and different events.

When Eaton's Ephesus Lighting business, in Syracuse, N.Y., retrofitted the Bridgestone Arena, in Nashville, Tenn., in 2015, the luminaire manufacturer replaced the existing HID system with LEDs, allowing facility managers to create unique lighting scenes for the NHL and NCAA basketball games that it hosts. "They can hit a button and go into hockey mode and have a cool temperature light, and [then] they can hit a button and go into basketball mode and have a warm temperature light and maintain the same level of intensity that they need for illuminance and for uniformity," says Eaton's Ephesus Lighting business president Mike Lorenz.

"We're starting to think about the field of play not as a horizontal surface but as a volume of space."

—Jay Wratten, senior associate, WSP | Parsons Brinckerhoff

Additionally, owners can adjust the fixtures' CRI to enhance team colors on the field, ice, or court, for example, or create a theatrical lighting experience that makes the event memorable for fans; in the locker room, bright light can be used to help players prepare for a game while warm light can be used post-game to help them decompress. "It's all customizable based on what event you are holding and what you want the end user to ultimately experience," says Dan Webb, the lead electrical engineer for Henderson Engineers' work on the forthcoming Los Angeles NFL Entertainment District Stadium.

Broadcast quality is another consideration for professional and some collegiate stadiums. Using LED sources reduces flicker for high-definition broadcasts, increasing the frames per second allowed without making flicker perceivable to the human eye, Webb says. And "if we can get the quality of the lighting to look more like [what] the camera wants to see, then [the broadcast networks] have to make fewer adjustments and that improves the quality of the video," Wratten says. LED systems' adjustability affords another advantage—adjusting light levels when meeting broadcast requirements is not necessary.

Another benefit is that instead of reacting to a failed fixture, LED lighting systems like the one Eaton's Ephesus Lighting business makes offer diagnostics to monitor the health of the system—such as humidity, temperature, energy consumption, and hours of operation, to indicate when it may need to be replaced.

IMPACT: THE FANS

With stadium owners seeking to get maximum value for their investment in LED lighting, fans can expect an immersive experience. "The well-lit stadium is a stage," says Wratten, whose firm is working with HOK on the lighting design for the Mercedes-Benz Stadium in Atlanta. "We can essentially spotlight the center of the 50-yard line with four, eight, 12 fixtures, and leave the rest of the stadium dark or make it a color."

That technology is also being used to create dynamic, theatrical experiences previously impossible with metal halide, and as a result often relegated to video screens. These include effects like strobing, chasing, and pulsing to highlight good plays and scores; announcing the starting lineups; integrating music or video; and syncing up with sensors for occupancy or temperature. "You've now taken a system that was historically one-dimensional and turned it

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into a multidimensional tool that can be used to enhance the fan experience, which is important to sports venues that are trying to attract people," Lorenz says.

That experience will soon extend beyond the field. Swapping diffuse metal halide luminaires for point-source LED fixtures has required lighting designers to think more about how the seating area, or "bowl," is illuminated. "We used to not light the bowls directly," Wratten says, citing light spill from the field. "But because LED fixtures are so much more focused, we're actually adding a totally secondary system of bowl lights,

A rendering of the forthcoming Los Angeles NFL Entertainment District Stadium featuring an expansive ETFE roof and ample daylighting on the field of play and in the bowl.

and we can control those systems independently." That could mean turning down those lights during game play, for example, enough to draw attention to the field while still allowing fans to capture the experience on social media. "How do you design the lighting so that the selfies—the 'Check out the view from my seat' videos—look good?" Wratten says. "For a stadium that has a solid façade, we may increase the light level in the bowl so that your selfie shot actually looks a bit better than it could if we just had the field glowing brightly behind you."

IMPACT: THE PLAYERS

LED lighting deserves particular consideration for the way it stands to impact the players, such as adding the ability to adjust the CRI to meet the specific needs of the sport being played, especially in venues that host a variety of events. For sports that feature fast ball movement, such

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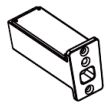
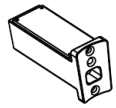


Type B Adaptor



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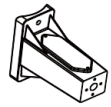

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The potential of LEDs for sports lighting is becoming clearer.

as tennis or baseball, a higher CRI provides sharper light and reduces shadowing.

Ethylene tetrafluoroethylene (ETFE) roofs, such as those topping the U.S. Bank Stadium in Minnesota and the forthcoming Los Angeles NFL Entertainment District Stadium, also help by bringing daylight onto the field year-round. "Fabric roofs allow the light to come in but you don't see the ... sunlight that you do with an ETFE roof," says John Hutchings, principal at HKS, in Dallas, which designed both stadiums. "It's a different kind of feel."

However, more daylight may not reduce demand for electric lighting. "If you look at an open-air stadium that's got a 2 p.m. game, the lights are on, [the broadcast networks] are going to want those lights on so their cameras are ready if the sun goes behind a cloud or there's any change," Wratten says.

And even in the same sport, different teams have different preferences. "When you look at a market like Los Angeles, where two NBA teams play in the same venue (the Staples Center), you'll notice that the Lakers prefer their lighting to be more theatrical and brighter, focused on the court, while the Clippers like a broader wash of light that includes the first few rows of fans," Webb says. "Some of that color temperature and lighting adjustment is just a personal preference, while some of it is critical to enhance the sport that is being played."

One challenge for LED-lit stadiums is glare. The optical control afforded by LEDs results in visual hot spots—if a player isn't standing in the direct line of a fixture's aiming, it may appear off, making the fixtures that do shine right at them brighter by comparison. Another consideration is rendering the ball, a need that differs by sport. In baseball, for example, a pop-fly after dark can go above the light level and become difficult to see. "[We're] starting to think about the field of play not as a horizontal surface but as a volume of space where the ball needs to travel through and be rendered all the way," Wratten says.

An all-inclusive LED approach is only beginning to take hold in stadiums, and only the most high-profile are likely to see overhauls for the time being, with smaller university, college, and community facilities' lighting choices still being driven primarily by cost. Still, the potential of LEDs for sports lighting is becoming clearer.

What can LEDs provide stadiums in the future? A platform for integrating a variety of systems, from location positioning technology that would allow a fan to have a drink delivered to their seat, to occupancy sensors that would notify facility management when a bathroom may have been trafficked enough to require cleaning, to security and emergency response systems. "To get that level of integration," Wratten says, "you're going to need a stadium that's been designed post Internet of Things, where, holistically, those [systems] tie together." •

ILLUMINATING THE FIELD

Lighting an entire sports arena is no easy feat, but with the aid of these six luminaires, advanced LED technology usurps metal halide fixtures in uniformly lighting large areas for high-definition broadcasting.

1

2

3

text by Selin Ashaboglu

1 **ArenaVision LED, Philips** • This floodlight, created with super-slow-motion HDTV broadcasting in mind, features an S3 optic and provides flicker-free illumination for indoor and outdoor venues. The IP66-rated fixture head uses a bracket mounting and can be aimed in 5-degree intervals via a locking mechanism on the side of the housing. It is capable of meeting various sports federations' approved lighting requirements as well as offering options for entertainment applications through the luminaire's control system. The BVP420 model (shown) is available in 5700K with a CRI of 85-plus and outputs 66 lumens per watt. • *usa.lighting.philips.com*

2 **Spec Pro SportsLighter Series, Spec Grade LED** • This LED luminaire family is geared toward replacing high wattage—2,000W to 5,000W—metal halide (MH) fixtures while maintaining beam uniformity. The 800W and 1,000W models (shown), replace 2,000W and 2,500W MH luminaires, respectively. All of the SportsLighter series use Lumileds' Luxeon T LEDs and a double-folded-fin aluminum heat sink. Available in 4000K and 5000K with a CRI of 74, the fixture housing is composed of die-cast aluminum and is IP65-rated; the light engine is IP66-rated. Zero-to-10V dimmable with glare shield options, and available in powdercoat white, black, and gray finishes. • *specgradeled.com*

3 **Arena LED Series, Hubbell Lighting** • Designed specifically for indoor sports facilities, this LED luminaire is intended to replace 1,000W MH fixtures while delivering up to 46,000 lumens. Available in 4000K and 5000K at a CRI of 70, the 408W fixture can be mounted on a standard or catwalk yoke at a 45-degree angle. The Arena LED's gasketed design resists dust and moisture, while a remote driver enclosure allows for increased thermal control. • *hubbelllighting.com*

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5

6

4 **Q-LED System GameChanger Series, Qualite** • Designed for HDTV broadcasting, digital photography, and slow-motion recording, this pre-aimed, pre-wired light-rack luminaire system makes it easier to record fast-moving sports while eliminating the need for supplemental lighting. GameChanger comes in a 500W and a 1,000W model with a lumen output of 58,000 and 115,000, respectively. It is available in two lengths—25" and 49"—both of which use 5600K LEDs with a CRI of 70-plus. Glare control is achieved with a TIR optic to prevent light spill. IP66-rated. • *qualite.com*

5 **LED Courtblade (XARL), LSI** • The pole-mounted Courtblade comes in 4000K neutral white and 5000K cool white at up to 105 lumens per watt. It is zero-to-10V dimmable, IP65-rated, and can withstand temperatures as low as minus 40 C and as high as 122 C. The fixture head measures 46.3125" long by 25" wide and features a high-performance, multifaceted reflector that provides uniform forward-throw light distribution via a clear- tempered optical-grade flat glass lens, which is sealed in a weathertight aluminum frame. The die-formed aluminum housing comes in seven finishes, including black, bronze, and graphite. • *lsi-industries.com*

6 **Ephesus All Field Series, Eaton** • The first LED luminaire designed to retrofit into existing outdoor sports lighting infrastructure, according to the manufacturer, this high-powered luminaire is available in two models, a 550W version and 750W version with lumen outputs of 61,000 and 83,000, respectively. IP66-rated and NEMA 4X rated, it is offered with wired and wireless controls with Bluetooth monitoring. It runs on an input voltage of 240V AC to 480V AC. The 45-pound fixture measures 15" tall by 15.4" wide and has a versatile mounting bracket for new or retrofit installations. • *eaton.com*

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LIGHT & ARCHITECTURE DESIGN AWARDS

text by Elizabeth Donoff

2016 was a milestone for the AL Design Awards program. Now in its 13th year, it received a record high number of entries—more than 140 projects from around the world. But even with that large number of submissions, this year also was one of the most selective in terms of winners; the jury only chose nine projects overall. This speaks to the high caliber of lighting design being practiced worldwide (and submitted to the program) and to the rigor of the jury review and discussion, which is as integral a part of the award process as the project entries themselves.

It has been interesting to observe the make-up of the submissions each year as outside forces such as the economy, technological developments, and ever-evolving stylistic approaches influence the project cycle. In 2016, there was an exceptionally large number of entries in hospitality, more so than any other in the program's history. And yet, none of these projects were selected by the jury. But what has remained a constant tenet of the AL Design Awards, and will never change, is the selection of work that represents excellence and advances architectural lighting design as a whole. •

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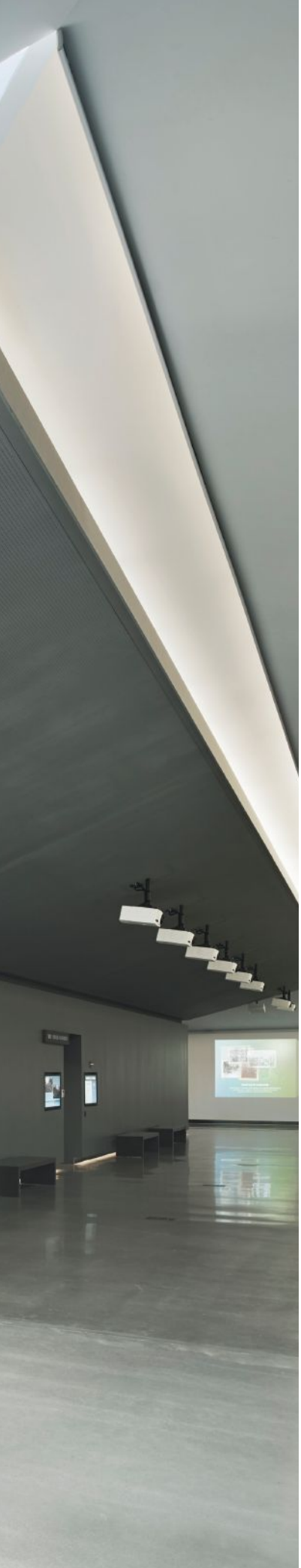


Completed in March 2015, the Edward M. Kennedy Institute for the U.S. Senate serves a dual purpose. First, it is a memorial to honor the legacy of the late senator Ted Kennedy, who served 47 years in the United States Senate. Second, it is an institution that is "dedicated to educating the public about the important role of the Senate in our government."

Located on Columbia Point in Boston, overlooking Boston Harbor and adjacent to the JFK Presidential Library and Museum, the Kennedy Institute was designed by Rafael Viñoly Architects. The building, a box within a box, follows a minimalist style. New York–based One Lux Studio was tasked with realizing the lighting design—a "careful composition of different layers and tones of light on muted finishes." Adding to the project's complexity was the exhibition design, which includes a full-scale replica of the U.S. Senate chamber, the centerpiece of the building.

The geometry of the architecture is evident in the lobby. A skylight brings natural light into the space and delineates the perimeter white sloped-ceiling from the gray sloped-ceiling surface that acts as an exaggerated cornice for the stone memorial wall, a wall that also serves as the entry into the senate chamber. Modified LED-lensed wallwashers are recessed in the sloped ceiling in front of the wall and create only the slightest of reflections on the stone surface.

As the exhibition spaces continue to each side of the memorial wall, the skylight transforms into an LED light cove. Because all of the exhibits are digital and projected onto the surrounding walls, natural light would have obscured the displays. To ensure visibility and uniformity, light levels are held to 20 lux.

In the senate chamber replica, the lighting recreates the look and feel of the actual chamber. There are custom wall sconces at the balcony and a unique glass laylight system at the perimeter of the space which puts light on the balcony wall.

At night the building comes alive in a subtle color temperature shift that creates a visual hierarchy of light. The forecourt walls are lit with 3000K metal halide in-grade uplights to match the color temperature of the lobby light. Bollards with custom-designed glare shields provide light for the front walkway. The main entry path is flanked by 50 bollards, one for each state, that each use 3200K. In the background, the dark gray metal-enclosure of the senate chamber appears to float above the building and is highlighted by 16 400W 4100K metal halide spotlights. The visual progression from ground to sky and the associated color temperatures—3200K to 4100K—provides a visual clarity while creating a unified and contemplative composition. —ELIZABETH DONOFF

Details

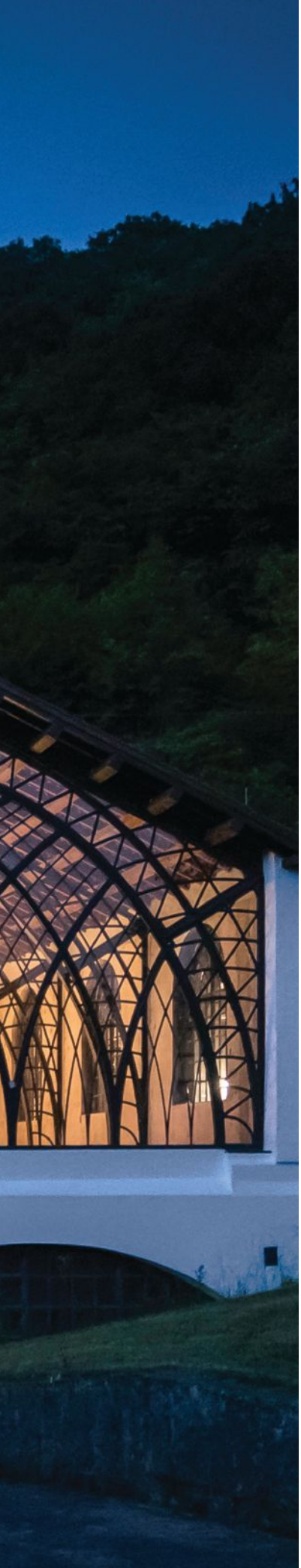
Project: Edward M. Kennedy Institute for the U.S. Senate, Boston • **Client:** Edward M. Kennedy Institute for the U.S. Senate, Boston • **Architect:** Rafael Viñoly Architects, New York • **Lighting Designer:** One Lux Studio, New York • **Team Members:** Jack Bailey, Yasamin Shahamiri • **Photographer:** Halkin Mason Photography • **Project Size:** 68,000 square feet • **Project Cost:** $78 million • **Lighting Costs:** Withheld • **Watts per Square Foot:** 1.13 • **Code Compliance:** ASHRAE 90.1-2007 • **Manufacturers:** Acuity Brands/Winona Lighting, Bega, iGuzzini, Philips Color Kinetics, Targetti

Jury Comments

There is a softness about the lighting • The exterior lighting is exceptional in the way it handles the shift in color temperature

SAYN IRON WORKS FOUNDRY

Entrant: Licht Kunst Licht



The Sayner Hütte ironworks foundry was constructed in 1830, near the Rhine River, "as an iron cathedral" and became a prototype for the architecture that would later be characteristic of the Industrial Revolution. Today, this former home to furnaces that spewed molten-like metal is a cultural center that hosts events for the local community in the southwest German state of Rhineland-Palatinate, bordered by France, Belgium, and Luxembourg, and whose capital is Mainz.

The new lighting scheme recalls the building's former use as an ironworks and employs a fully controllable lighting system composed of a fiery-toned color palette of warm- and cool-colored RGB LED luminaires. Individual fixture mounting locations were selected so that the luminaires could be carefully integrated into the heritage-protected structure.

The building's western façade provides a central view of the space and recalls the "metaphorical path" the iron once took from the back wall where the main furnace was located through the building and out to wagons. The new lighting seeks to emphasize the "lightness and transparency" of the glass and iron structure, which is arranged in a basilica-like layout, with a central core of paired columns that support two main horizontal steel members and the roof's metal truss system and red clay tiles.

The lighting is designed to be flexible so that it can accommodate the variety of events that take place within. Fixtures are mounted along the horizontal plane of the main steel members that span the length of the space. This helps to accentuate the building's length, while also highlighting the verticality of the central columns and their architectural details.

General lighting for the interior is set at a warm-white 3000K while the columns are accented with 4000K white light. The back wall, the only location to receive direct light, is illuminated by a series of floor-recessed RGB linear wallwashers. The central aisle and clay roof tiles are uplight to intensify their red color. The ceilings for the side aisles receive a gentle wash of light from the inter-reflection supplied by the downlighting. This occurs via two types of adjustable spotlights, a 36W fixture outfitted with a honeycomb-louver and a 17W fixture with a snoot, both to provide precise aiming and reduce glare. Each is painted in a finish to match the cast-iron columns.

The overall contrast between light and dark in the project is a nod to building's former use as a foundry and the surrounding mountain from which the iron ore was mined. Once again, the Sayner Hütte glows from within. —E.D.

Details

Project: Sayn Iron Works Foundry, Bendorf, Germany • **Client:** City of Bendorf, Germany • **Architect:** Not Applicable • **Lighting Designer:** Licht Kunst Licht, Bonn, Germany • **Team Members:** Johannes Roloff, Stephanie Jochem, Andreas Schulz • **Photographer:** Thomas Naethe • **Project Size:** 47,899 square feet • **Project Cost:** Not Available • **Lighting Costs:** $174,176 • **Watts per Square Foot:** 0.4 • **Code Compliance:** Not Applicable • **Manufacturer:** iGuzzini

Jury Comments

Not an easy challenge to pull off the metaphor of a fiery-like light • Well done • Deft mix of warm and cool color temperatures

"MANUS X MACHINA: FASHION IN AN AGE OF TECHNOLOGY," METROPOLITAN MUSEUM OF ART

Entrant: Dot Dash

The Metropolitan Museum of Art's Costume Institute annual spring exhibition has become one of the museum's most highly anticipated shows. For 2016, the Met debuted "Manus x Machina: Fashion in an Age of Technology," which features 170 garments from the early 1900s to present day and "explores how designers are reconciling the handmade and the machine-made in the creation of haute couture and avant-garde ready-to-wear."

The architecture office of OMA New York and lighting design firm Dot Dash were challenged to meet an eight-week schedule to realize the project. To accomplish this, the designers were teamed with a local manufacturer to prototype, fabricate, and install more than 250 fixtures. After testing a number of market-available halogen and LED luminaires, Dot Dash determined that a custom fixture would be the best solution to provide the optimal color temperature (3000K), output (5W), and adjustability necessary to illuminate the garments. To this last point, the custom accent light "includes a zoom lens for beam spread adjustment and an integral rotary dimmer to set the output based on the throw distance." This met the conservationist's requirement of no more than 5 footcandles, while minimizing spill light and shadowing on the scrims behind each exhibit item. Dot Dash also developed a custom mounting system from Unistrut components instead of using an electrified track, to further reduce project costs.

The exhibit begins as visitors enter the Cocoon, a 52-foot-tall translucent white volume that dramatically transforms the interior of the museum's Lehman Wing into a cathedral-like space (opposite). Here, museum-goers are greeted by a Chanel wedding dress made out of scuba diving suit material with an embellished 20-foot-long train designed by Karl Lagerfeld in 2014. The Cocoon's domed ceiling is used as a projection surface to reveal the intricate detail of the train. The gown is illuminated by 24 individually controlled DMX fixtures. Along the perimeter of the space are cases outfitted with a custom LED light bar that house eight of French philosopher Diderot's *Encyclopédies* that detail "the processes involved in the creation of fashion."

The exhibition continues downstairs in a series of lower-level galleries. Theatrical-style LED luminaires using the custom Unistrut mounting system cross light the angled walls of each niche to create a shadow-free, gradient of light (above). Throughout the exhibit the lighting provides a neutral white light that complements the garment accent lighting and creates an overall balanced effect to showcase the spectacular garments on view. —E.D.

Details

Project: "Manus x Machina: Fashion in an Age of Technology" at the Metropolitan Museum of Art's Costume Institute • **Client:** The Metropolitan Museum of Art, New York • **Architect:** OMA New York, New York • **Lighting Designer:** Dash Dot, New York • **Team Members:** Christopher Cheap, Isa Sanchez Sevilliano, Jelisa Blumberg, Brian Cheap • **Photographer:** Albert Vecerka/Esto • **Project Size:** 20,000 square feet • **Project Cost:** $6 million • **Lighting Cost:** $150,000 • **Watts per Square Foot:** 0.45 • **Code Compliance:** Compliance was not required but the lighting power density was well below ASHRAE requirements • **Manufacturers:** 1212 Studio, A&L Lighting, Diode LED, ETC Lighting

Jury Comments

Lighting solution is well executed • Impressive, given the eight-week time frame • Balanced color temperature

85 BROAD STREET

Entrant: One Lux Studio

You could say the design of the basement cafeteria at 85 Broad Street in lower Manhattan has been put through its paces. The newly refurbished cellar space was barely a month old in October 2012 when Hurricane Sandy hit New York City and was completely flooded, destroying all the previous work.

Flash forward and, once the arduous task of clean-up was complete, the owner sought to "reposition" the cafeteria as an amenity space that could compete with area restaurants during the breakfast and lunchtime hours, in an effort to draw tenants back to the building. New York–based architecture firm Mancini Duffy and lighting design firm One Lux Studio were hired to formulate a new design that would make the windowless space feel open and expansive despite having no access to natural light.

The architect and lighting designer collaborated to choose lighting and finish selections in an effort "to make this dining facility a place where people want to come and enjoy a part of their day." As a result, the contemporary decorative luminaire selection, combined with a neutral palette of wood, reflective metal surfaces, and gray and brown tones, creates an inviting space that does not feel claustrophobic or dimly lit.

One of the particular challenges that the design team faced was the low ceiling height of only 8 foot 6 inches. The designers worked with this impediment by creating open spaces with light-colored floors and a mirrored ceiling that inspire a feeling of lightness and makes the space appear larger than it actually is. This is countered with seating areas accented with wood finishes that provide a more intimate feel.

Other highlights in the main dining room include a color-changing luminous box that was designed as an illumination feature over one of the communal tables. Normally white, it can be programmed to change color for special events.

In the servery, a curvilinear stainless steel soffit is lit with an indirect LED covelight to highlight the free-form shape. LED downlights with a CRI of 90 and LED striplights concealed in the sneeze guard illuminate the food. Behind the server stations, the supergraphics are lit with LED wallwashers.

One of the most significant features of the design is the serpentine wall of vertical white baffles that runs the length of the dining area. Fitted with a color-changing uplight at its base, the entire wall is set to a slow scene-change so that the colors "magically appear" and recall the feel of natural daylight as it evolves during the day. The palette is limited to calm colors for everyday use, but can be switched to show modes for special occasions.

In this basement, light, materials, and finishes combine to create an inviting environment for building tenants in a space where natural light is hardly missed. —E.D.

Details

Project: 85 Broad Street, New York • **Client:** 85 Broad Street LLC—a subsidiary of MetLife Inc. • **Architect:** Mancini Duffy, New York • **Lighting Designer:** One Lux Studio, New York • **Team Members:** Stephen Margulies, Adriana Amendolara • **Photographer:** Eric Laignel • **Project Size:** 20,400 square feet • **Project Cost:** Not Available • **Lighting Costs:** $306,000 • **Watts per Square Foot:** 0.8 • **Code Compliance:** New York City Energy Code • **Manufacturers:** Kurt Versen (Hubbell Lighting), Mooi, Newmat, Philips Color Kinetics

Jury Comments

Well balanced • Solved a lot of problems • Respectful of the materials • Nice juxtaposition and choice of color temperatures • Shows a level of simplicity and restraint

KIRIKKALE MERKEZ NUR MOSQUE

Entrant: Zeve Lighting

A new mosque has risen at the center of the burgeoning city of Kırıkkale, the capital of Turkey's Central Anatolia region. Located nearly 50 miles east of Ankara, but still in the western half of the country, the city is home to a population of almost 200,000. The Kırıkkale Merkez Nur Mosque, which was designed by Turkish architect Necip Dinç and completed in 2015, accommodates up to 10,000 worshipers at a time. Its design borrows from 16th century Ottoman influences, such as Mimar Sinan's Selimiye Mosque across the Bosphorus in Edirne, with a central dome that reaches 105 feet high and four 200-foot-tall minarets at its outlying edges. Eight carrier columns radiate from the central dome to distribute the structural load outward. Five additional domes shelter the entrance, and a dome-covered portico extends along an east–west axis to provide shaded access to the mosque, as well as a buffer between city and courtyard.

In order to make this place of worship a focal point for the city, the design team from Istanbul-based Zeve Lighting chose an illumination strategy that emphasizes the depth of the mosque's architectural features, using a variety of color temperatures to establish a visual hierarchy on its surfaces. The interplay between light and shadow assists in that overall effect, with half-domes in shadow and patterned windows lit by narrow-beam uplight. Cool-white light washes the curves of the central dome, while warm-white light adds linear definition to the undersides of the minaret balconies and the crescent at the dome's apex. Cool-white fixtures embedded into niches in the minarets illuminate the rectangular windows.

Zeve Lighting used short-throw, narrow-beam luminaires to accentuate the high-relief patterns of muqarnas, a form of high-relief honeycomb-like vaulting, above the columns. Wide-beam fixtures bathe the undersides of the entry dome with warm-white light, and a warm-white spotlight demarcates the main entrance. Where possible, fixtures were concealed or painted to match or minimize their daytime visibility.

Kırıkkale is a city that will continue its growth around the mosque, with additional demands for resources arising as it expands. Recognizing that sustainable lighting design is an important means of energy reduction within the city, LED luminaires are used exclusively, and programmed lighting scenarios minimize the mosque's overall energy consumption, while still underscoring its prominence at the city's center.
—DEANE MADSEN

Details

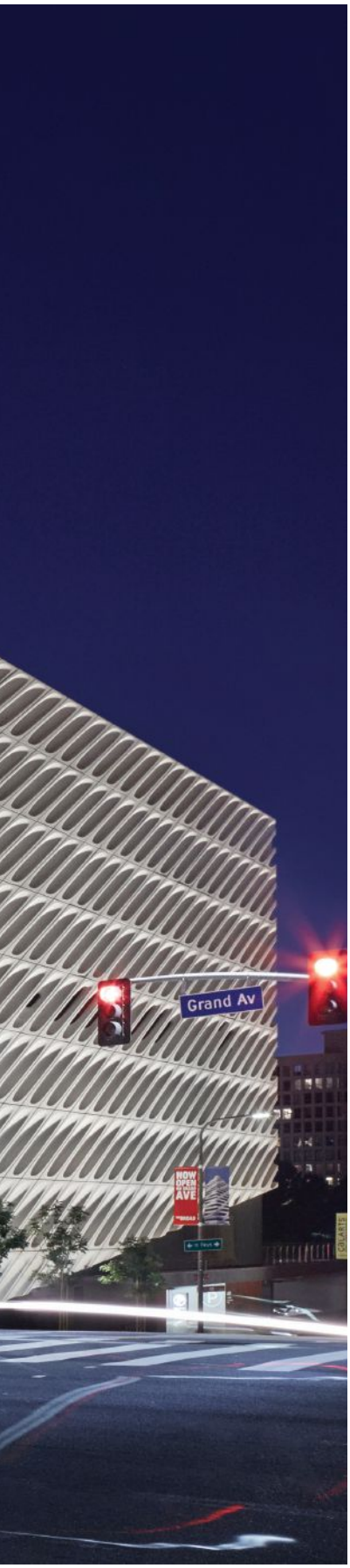
Project: Kırıkkale Merkez Nur Mosque, Kırıkkale, Turkey • **Client:** Turkiye Diyanet Foundation, Kırıkkale, Turkey • **Architect:** Necip Dinç, Istanbul • **Lighting Designer:** Zeve Lighting, Istanbul • **Team Members:** Ayrim Yaser Talu and Kenan Akifoglu, 3D Visualization Artist • **Project Coordinator:** Bekir Gerek, Kırıkkale Provincial Mufti • **Photographer:** Idris Ekinci • **Project Size:** Total lighting area is approximately 7,040 square meters (75,778 square feet). The building is 2,450 square meters (26,371 square feet). Height of main dome from the ground is 32 meters (105 feet); height of minarets is 61 meters (200 feet), and inner diameter of the dome is 20 meters (66 feet) • **Project Cost:** €11.6 million ($12.7 million) • **Lighting Costs:** €135,000 ($148,000) • **Watts per Square Meter:** 2.07, Total Power 14.6kW • **Code Compliance:** Not Applicable • **Manufacturer:** Philips Color Kinetics

Jury Comments

Scale is extraordinary • Chose the right surfaces to light • Color temperature selection is very good • Contrast is just right • Right amount of balance

THE BROAD

Entrant: Tillotson Design Associates



Los Angeles' downtown cultural hub on Grand Avenue gained a marquee building in 2015 with the opening of The Broad, a contemporary museum designed to house and showcase the 2,000-piece Broad art collection assembled by real estate moguls Eli and Edythe Broad. Designed by New York–based Diller Scofidio + Renfro with the local office of architectural firm Gensler, The Broad was conceived as two main programmatic elements, gallery and archive (or "vault"), draped with a "veil" of perforated fiber-reinforced concrete.

The museum's exoskeleton combines structural performance with daylighting strategies: The self-supporting façade and roof allows for a column-free third-floor gallery space, while the apertures that pierce it aim northward to admit soft daylight through skylights. But with the formal language of the exterior's repetitive façade comes the challenge of uniform lighting—one which Tillotson Design Associates addressed with measures aimed at both accentuating each cell within the façade and treating the façade as a whole surface.

At the street-level corners, the veil lifts to form the entrances, which are uplit with in-grade perimeter halogen fixtures outfitted with shutters to precisely light the canopies. Beneath the veil, the charcoal-colored mass of the vault rises from the ground to cantilever over the lobby and museum shop (this page). Recessed ports with flush-mounted fixtures provide subtle illumination for the ground-floor lobby without disturbing its smooth plastered ceiling. The vault's cave-like underbelly is interrupted by cylindrical escalator shafts, a winding staircase bracketed with linear LED striplights in a perimeter cove, and a luminous-floored glass elevator that emerges into the third-floor gallery.

Inside the vault, fixtures are controlled to prevent overexposure of sensitive artworks, and align with storage system tracks. An indentation on the Grand Avenue façade presses into a multipurpose room, where wallwashers are interspersed in a general grid of downlights that highlight the architectural impression.

In-grade LED wallwashers and accent fixtures bathe the exterior shell in a gradient of light and provide dramatic contrast with shadow-filled cavities without creating reflections from glazing embedded in the shell. This treatment produces a glowing effect that makes the bright veil appear to hover over the dark vault within. On-site mock-ups ensured that the lighting would not exceed city guidelines. Along the museum's southern edge, a pedestrian plaza planted with olive trees receives after-hours electric light from pole-mounted framing projectors that employ shutters to reduce light spill onto the façade.

With a lighting strategy that emphasizes contrast in the facade's relief patterns, The Broad capitalizes on the interplay between surface and depth in a new arts destination for L.A. —D.M.

Details

Project: The Broad, Los Angeles • **Client:** The Broad, Los Angeles • **Architect:** Diller Scofidio + Renfro, New York with Gensler, Los Angeles • **Lighting Designer:** Tillotson Design Associates, New York • **Team Members:** Suzan Tillotson, Erin Dreyfous, Megan Trimarchi • **Photographer:** John Muggenborg Photography • **Project Size:** 120,000 square feet • **Project and Lighting Costs:** Not Available • **Watts per Square Foot:** 1.19 • **Code Compliance:** Title 24 and ASHRAE 90.1-2007 • **Manufacturers:** B-K Lighting, LED Linear, Lucifer Lighting, Nulux, Spot on Lighting, We-ef

Jury Comments

Deliberate strategy of where to put the light • No hotspots • Lighting doesn't detract from the architectural form

DARYL ROTH THEATRE

Entrant: Cline Bettridge Bernstein Lighting Design

The Daryl Roth Theatre is located across from Union Square Park in New York City. Housed in the former Union Square Savings Bank, originally designed by architect Henry Bacon in 1907, the building, which has landmark status from the New York City Landmarks Preservation Commission (LPC), had never been illuminated.

Initially, the client, Daryl Roth Productions, contacted Cline Bettridge Bernstein Lighting Design (CBBLD) to explore how they might illuminate the classical-style architectural details of the façade, but an early mock-up revealed that it would not achieve the desired effect. The client then decided to illuminate the entire exterior.

CBBLD began by making a historical survey of the ways in which building façades have traditionally been illuminated. With this information, they embarked on a trio of detailed studies. They also had to create the base documentation. The firm's research into the building had unearthed only one drawing of the structure. Using that, plus photos and site measurements, CBBLD constructed the CAD documentation needed for renderings, light modeling, and client and LPC presentations.

Dimmable LED linear wall grazers mounted to the theater's cornice proved to be the solution. This approach put the light where the designers wanted it, achieving enough contrast across the façade while highlighting the architectural details. It also provided minimal light at the sidewalk without any spill light to the surrounding buildings or park. The problem, though, was there were no market-available fixtures that could do the job. So CBBLD worked with a manufacturing partner to develop the custom fixture, optics, and rigging system.

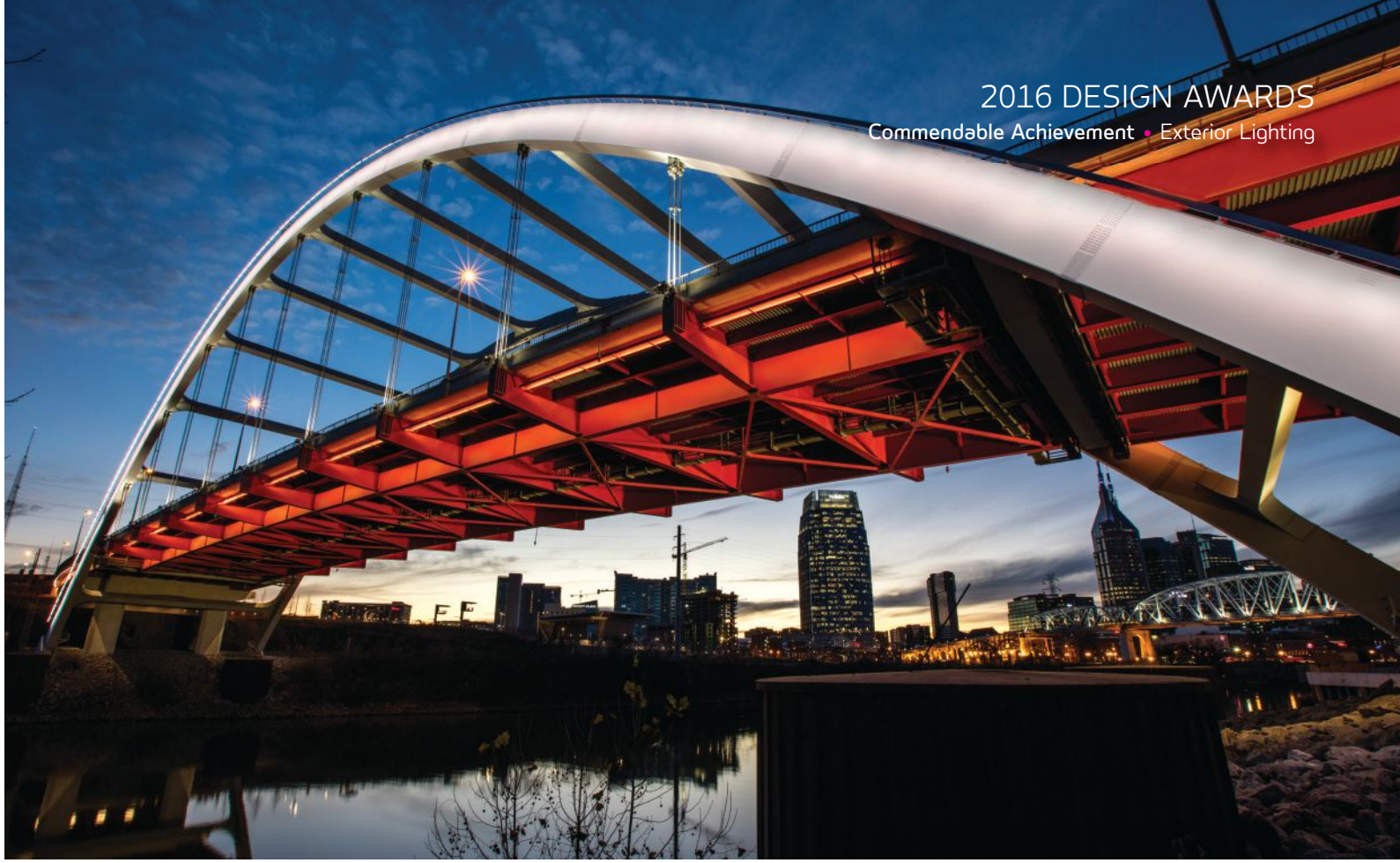
The wallwasher features two separately adjustable, 2.625"-wide linear fixtures, paired and mounted together. A 34-degree beam illuminates the upper portion of the façade and a tight 9-degree beam illuminates the lower portion of the façade. With uplights on the cornice to light the balustrade and concealed uplights on the window sills to highlight the metal work and lintels, the building welcomes theatergoers and serves as an illuminated reference point for the neighborhood. —E.D.

Details

Project: Daryl Roth Theatre Façade, New York • **Client:** Daryl Roth Productions, New York • **Lighting Designer:** Cline Bettridge Bernstein Lighting Design, New York • **Team Members:** Francesca Bettridge, Michael Hennes, Jeff Hoenig • **Architect:** Rosen Johnson Architects (consultant for Landmarks Preservation Commission approval process) • **Photographer:** David Sundberg/ Esto • **Project Size:** 17,482 square feet (building façade) • **Project and Lighting Costs:** Withheld • **Watts per Square Foot:** 0.2 • **Code Compliance:** Meets building façade requirements for ASHRAE 90.1-2007 • **Manufacturer:** Acolyte

Jury Comments

Have a lot of respect for the complexity of the design challenge • Uniform • Bold move to bracket the fixture



KOREAN WAR VETERANS MEMORIAL BRIDGE

Entrant: Domingo Gonzalez Associates

Entering Nashville, Tenn., across the Cumberland River, you traverse the city's Korean War Veterans Memorial Bridge, a 1,660-foot, clear-span, through-arch structure that was completed in 2004 and serves as the city's gateway for more than 17,000 drivers who cross it each day. Originally named the Gateway Bridge, it was rededicated in 2006 to honor the more than 134,000 Tennesseans who served during the Korean War. Less than a decade later, the technological possibilities afforded by advancement in LEDs rendered the bridge's lighting systems obsolete, and the city's Metro Public Works engineering division led an effort to relight the bridge under the guidance of New York–based Domingo Gonzalez Associates (DGA).

The DGA team was presented with a number of challenges: a compressed timeline, minimal budget, engineering requirements for allowable fixture attachment to the structure, and the need to reduce energy consumption by a minimum of almost 50 percent. Modeling tools allowed the team to present renderings with a high degree of fidelity to the bridge stakeholders within the 11-month sprint from concept to completion. Although the budget did not include replacement of existing streetlights, DGA was able to re-aim those in such a way as to reduce light pollution and glare. DGA achieved the fixture attachment requirements by clamping luminaires to the structure in lieu of bolting.

The bridge deck, which is painted a deep scarlet color, glows under continuous 3000K linear LED luminaires that accentuate the structural girders that support the 571-foot-long, 102-foot-wide clear span. Cool-white wide-beam floodlights enliven the 72 cables that suspend the bridge deck. Clamp-mounted linear RGB LED fixtures light the arches, and wireless controls allow programmable scenes to deviate from white to denote holidays and commemorate events.

To meet the maintenance demands and budgetary restrictions of this municipal project, individually addressable luminaires are also individually replaceable. The end result is an energy-efficient lighting solution that produces a rhythmic, glowing gateway to Music City that will welcome visitors for decades to come. —D.M.

Details

Project: Korean War Veterans Memorial Bridge, Nashville, Tenn. • **Client:** Metro Nashville Public Works, Nashville, Tenn. • **Architect:** Not Applicable • **Lighting Designer:** Domingo Gonzalez Associates, New York • **Team Members:** Domingo Gonzalez, Nancy Lok, Phat Quach • **Photographer:** Bob Schatz • **Project Size:** 169,320 square feet • **Project and Lighting Costs:** $2.3 million (each) • **Watts per Square Foot:** 0.24 • **Code Compliance:** Not Applicable • **Manufacturers:** Acuity Brands/Holophane, Acuity Brands/Winona, North Star Lighting

Jury Comments

A striking image in the landscape • Shielding of the fixtures is unified • Lighting serves as a continuum that accents the architectural form

MGM RESORTS INTERNATIONAL: THE PARK—SHADE STRUCTURES

Entrant: Arup

The Las Vegas Strip is lined with hotels and casinos that compete for attention with towering roadside signage, and the spectacle often reaches a frenzied level of visual activity. Although one might argue that people don't travel to Las Vegas to get away from it all, the edict to create a series of luminous shade structures, from the client of the first-ever recreational park on the Strip, could be considered a restrained design ask by Las Vegas standards. In turn, the project presented to the lighting designers the unique challenges of achieving brightness without being flashy and engaging visitors with design elements more sophisticated than ostentatious.

New York–based !Melk, the architecture firm responsible for the overall design of the new linear-shaped park located between the New York New York and Monte Carlo resorts, entrusted Arup with the task of lighting the 16 shade structures, which are made of perforated, 1-inch-thick, cold-formed steel arranged in groups of four. They flare outward as they rise and tower over trees planted within the landscape to offer relief from the desert city's arid conditions. The installation's complex, multi-axial curvature results in structural rigidity, but also non-uniform surfaces—an added challenge for the lighting designers.

The LED fixtures are internally mounted and shielded with custom louvers to keep out of view through the structures' apertures. The luminaires illuminate the edge surfaces of each perforation, which Arup elected to paint white to maximize the lighting effect.

The lighting strategy evolved from the concept of a sun-washed desert bloom. Dynamic lighting controls perform color shifts in a 15-minute animated "sunlight ballet" routine that starts with a golden yellow and reaches a crescendo with a deep magenta cactus blossom. A last-minute client request to make the scheme more Las Vegas–like brought about additional on-site testing, but still with an end result that is more composed than it is carnivalesque. —D.M.

Details

Project: MGM Resorts International: The Park—Shade Structures, Las Vegas • **Client:** Marnell Companies, Las Vegas • **Architect:** !melk, New York • **Lighting Designer:** Arup, New York • **Team Members:** Leni Schwendinger, Christoph Gisel, Matt Franks, Rohit Manudhane, Salome Galjaard, Simone Collon, Solmaz Esmailzadeh • **Photographer:** Hanns Josten • **Project Size:** 20,400 square feet • **Project Cost:** $100 million • **Lighting Costs:** $100,000 • **Watts per Square Foot:** 0.15 • **Code Compliance:** Not Applicable • **Manufacturers:** Lumenpulse, GrandMA

Jury Comments

Color speaks to the motivation of the project • Rational and poetic • Very strong concept • Clarity in the design intent • Appropriate for the context

140 NEW MONTGOMERY, THE MURAL ROOM, AND GRACE CHURCH

Lighting in a historic context creates specific and unique challenges.

How do you light in a historic context? This was one of the main questions that challenged the AL Design Awards jury this year. It's a multidimensional issue, as a lighting designer needs to try to separate the stylistic approaches of a previous era from the technical strategies of today. Of the submissions for 2016, three projects in particular embodied the complexity of this issue (clockwise from above right): the Grace Church renovation in New York City; the Mural Room in the Santa Barbara, Calif., courthouse; and the 140 New Montgomery lobby renovation in San Francisco. Putting aside the particular architectural styles of each—Gothic-inspired, Spanish Colonial, and Art Deco, respectively—there is no doubt that the new lighting employed for each transforms their spaces and brings to life architectural details that were once obscured.

In the case of the renovation of Grace Church, on Broadway near New York University, Cline Bettridge Bernstein Lighting Design's scope of work was limited to the area around the alter just beyond the transept. The firm was asked to remedy problems with previous additions of downlights and to reduce the glare that obscured the rector's view of the congregation.

For the Santa Barbara Courthouse's Mural Room, Ann Kale Associates had to find a way to provide illumination for a space that had only ever been lit by two chandeliers and available daylight. Further, any new lighting solution had to do so without touching the delicate plaster ceiling and walls.

For the lobby at 140 New Montgomery, HLB Lighting Design took its cues from the Art Deco surrounds to provide an illumination level that would meet contemporary needs and energy requirements but use existing architectural elements to bridge the gap.

So, how do you strike the right balance? These three projects met their tasks and went beyond. They offer a variety of solutions and exemplify the particular difficulties that lighting designers face in these scenarios. —E.D.

Top left: Rien van Rijthoven; Bottom left: Ciro Coelho; Right: Robbie Lawson

Debra Gilmore, IALD, IES, ASLA
Principal, Gilmore Lighting Design, Bethesda, Md.
Gilmore brings 33 years of lighting experience to the table when working with clients. Her award-winning designs encompass a broad variety of projects, from conceiving and realizing master plans for corporate campuses to designing commercial interiors. She has been a guest critic for the architecture programs at the University of Maryland, Catholic University of America, and Parsons The New School for Design. Most recently, she has been selected as a workshop head for the 2016 Lights in Alingsås program in Sweden. As an IALD representative, Gilmore also served a two-year term on the 2014–15 Lightfair conference advisory committee.

Theresa Genovese, AIA, LEED AP
Principal, CetraRuddy Architects, New York
An alumna of the Harvard University Graduate School of Design where she earned her Master of Architecture and Urban Design degrees, Genovese is a registered architect in the state of New York. She is a leader of CetraRuddy's Sustainable Design Group and has extensive experience in both ground-up construction and renovations. She has designed a number of award-winning projects, including the Lincoln Square Synagogue in New York City and the Choice School campus in Thiruvalla, India. Her work has been exhibited and published internationally and she regularly serves as a juror and design critic at leading schools of architecture.

Justin T. Brown, IES
Associate Principal, Lam Partners, Cambridge, Mass.
With more than 17 years of experience in architectural lighting design, Brown draws on his background as a machinist and as an industrial designer for his work at Lam Partners, where he serves as a designer, project manager, and mentor. He is also responsible for developing and refining the firm's BIM workflow and standards; implementing new software- and hardware-based solutions for design, analysis, and visualization; and maintaining the office-wide IT infrastructure. His fabrication skills also allow him to specialize in custom fixture design for Lam Partners. His work has earned a number of awards in the lighting and architecture industries.

Maureen Moran, IALD, MIES
Principal, MCLA, Washington, D.C.
Moran, who founded MCLA in 1996, uses her 35-plus years of experience in lighting design to lead a talented team that creates award-winning designs for a wide variety of project types. The firm has worked on projects around the globe ranging in scale and scope from educational facilities to prominent federal and local government properties. MCLA's work has been published in a number of publications and honored with numerous awards from the IALD and the IES, as well as here in the AL Design Awards. A member of the IALD Ambassador program, she shares a mission to advance lighting education within lighting design programs.

Eli Meir Kaplan

The Tower at PNC Plaza includes special perimeter spaces that are designed to promote circulation and collaboration between floors. These double-height “neighborhoods” promise variety and a strong connection to the surrounding environment.

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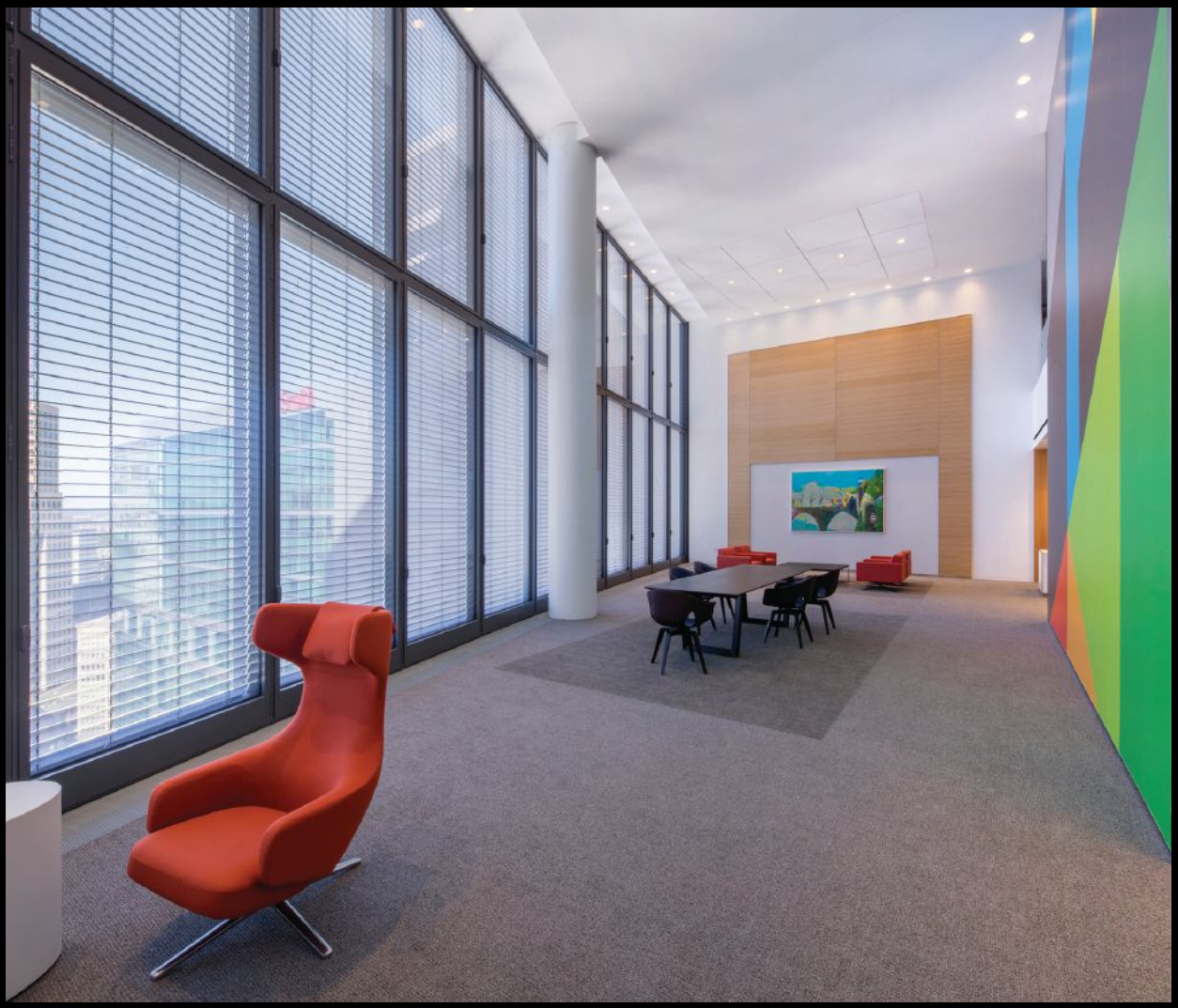

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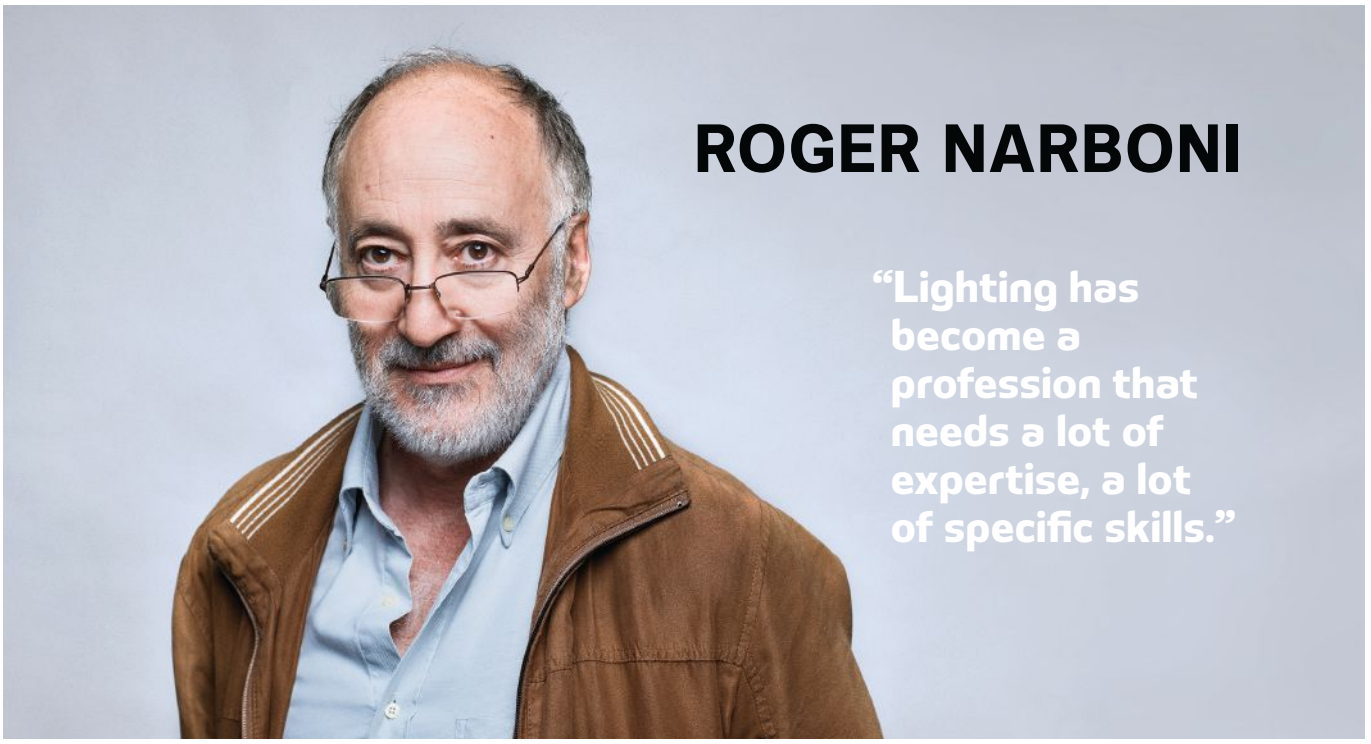

Roger Narboni is a pioneer. Trained in fine art and electrical engineering, he lived in New York from 1978–80 and was fascinated by the 24-hour life of the city. Returning to France in 1981, he began working with light as a way to bring these interests together. He found it easier to work at the scale of public space and began putting these ideas on paper. In 1986–87, he devised the term "concepteur lumière"—lighting designer—and paved the way for the practice of lighting design in France, using the word to convince others to pursue the field, and in particular to create urban spaces and affect the city's nighttime atmosphere. In 1988, he founded his firm Concepto. Over the course of his more than 30-year career he has worked around the globe on a variety of projects including the master plans for Paris, Jerusalem, São Paolo, and Hangzhou, China. And at the heart of each project is the individual and his or her experience with light.

How do you start your design process?
The process for a city and the process for an urban object are different. You have to work on many scales, from the global to the intimate.

What intrigues you about light?
It's a very contemporary material and yet we still have so much more to discover about it.

What are some differences you've observed in the way people respond to light?
People share an attraction to light but we are lacking a focus on a local culture of light. Globalization is creating uniformity, the "McDonaldization" of lighting. We need to collect, if it is still possible, the lighting cultures that we are losing. It's why when I work on a project I always insist on working with a local partner. I want to learn from them, their culture, their story.

What would you like to see happen in lighting that hasn't happened already?
An educational program that focuses on urban lighting and lighting master planning. There is nothing like that and we need an educational program dedicated to these fields.

What advice would you offer a young lighting designer?
Educate him or herself in many fields, cultures, techniques, and approaches. It's a long process. You need to be stubborn but open-minded. And never work alone: This is a multidisciplinary field that requires teamwork. •

interview by Elizabeth Donoff
photo by Antoine Doyen

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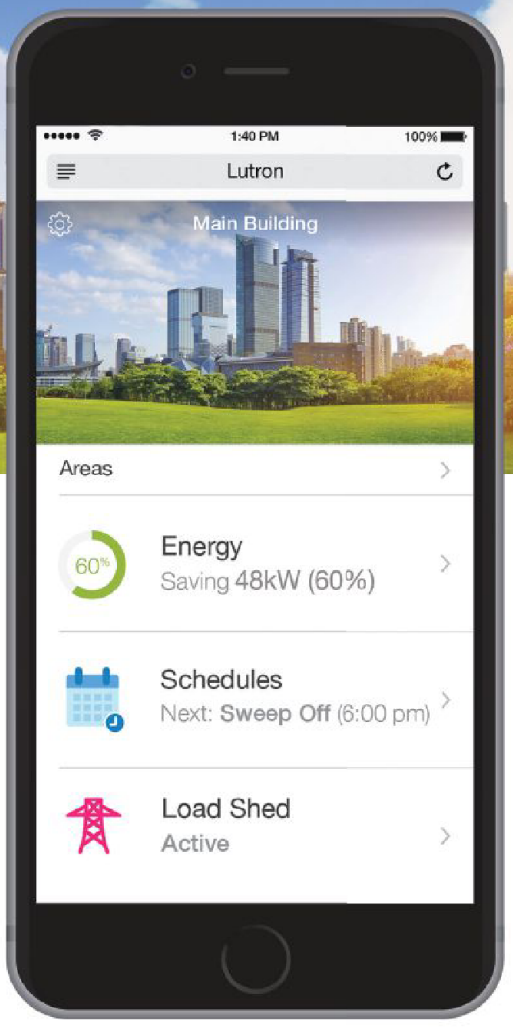

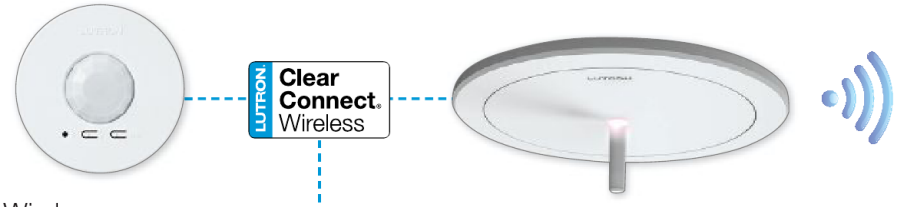

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