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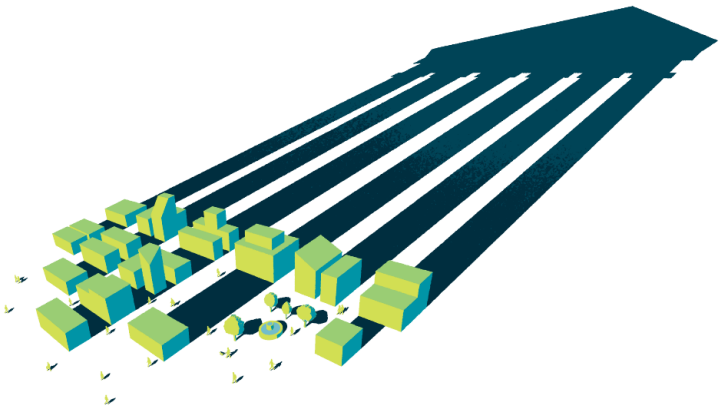

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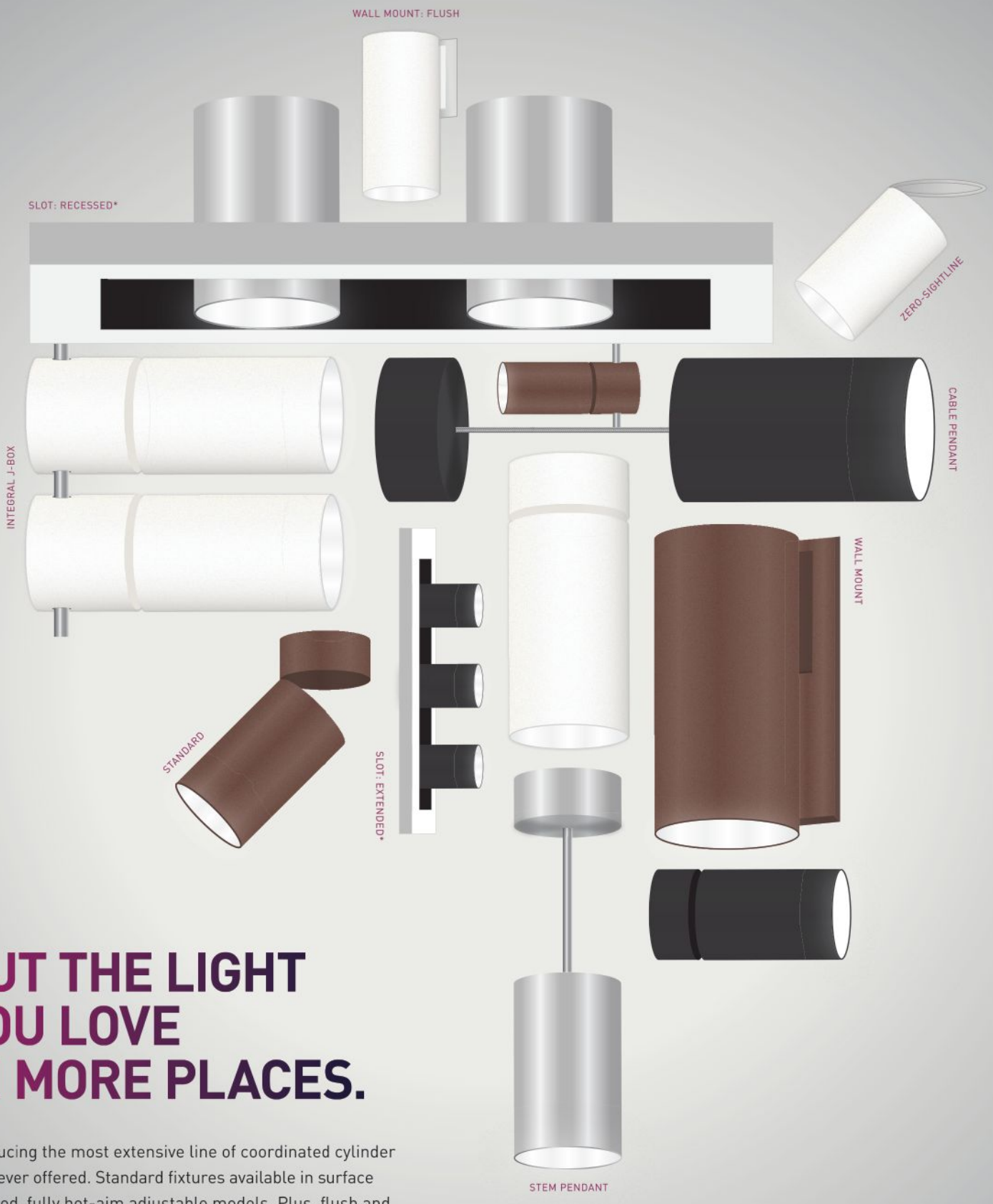

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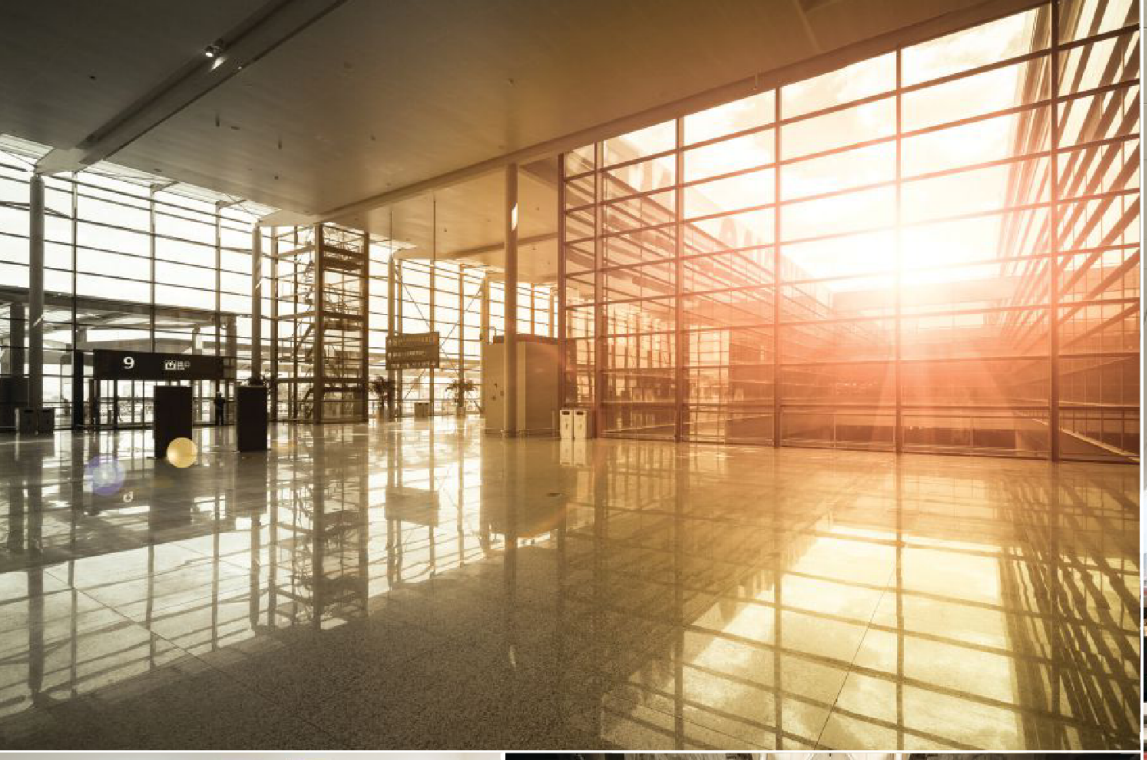
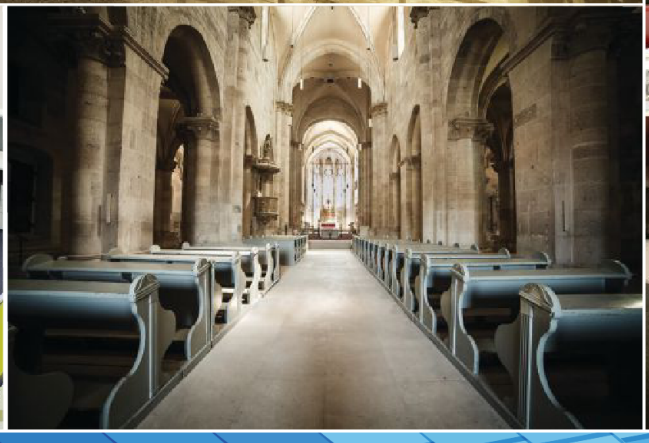
On the Cover:
Domingo Gonzalez Associates' lighting for The Dulles Metro Rail/Silver Line. Photo by Joseph Romeo Photography.

Top Left: Studio Dubuisson; Top Right: David Wakely Photography; Bottom Right: James Newton Photographs





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THE LIGHTING INDUSTRY'S DEFINITIVE MOMENT

Stephen Voss

The lighting industry has gone through a number of defining moments over the past decade, as it has embraced new technological paradigms and dealt with the economic recession and recovery. But at Lightfair this year, it struck me that when 2015 is over, we should look back and recognize this point in time as particularly distinctive. This marks a point of maturation, from a transitional phase when core light sources were completely turned upside down. In this new era, lighting manufacturers and lighting designers can begin to think beyond the basic technical components of an LED luminaire and start to see how solid-state lighting fits into a broader context of systems that have the ability to gather and transmit all types of data at an unprecedented scale. Lighting is now becoming a part of the Internet of Things.

We're still in the early days, as the lighting community figures out what connectivity really means in terms of project applications and the integration of different fixtures and building systems. We're seeing new platforms emerge for discussion within the industry, as evidenced by the inaugural Connectivity & Controls Forum at Lightfair this year (which you can read about in greater depth in this issue's Report, "The Future is in Lighting Controls," on page 17), and the U.S. Department of Energy's Connected Lighting Systems Workshop this upcoming November in Portland, Ore.

Twelve years ago, when I started at ARCHITECTURAL LIGHTING, the trade show experience was mainly about seeing new products, and that meant walking the expo floor seeking out all the latest luminaires with their new shapes and styles. Today's lighting trade show does not reveal what's new in such a straightforward, visual fashion. Lighting is becoming less and less about the fixture as a singular object. Rather, so much of what's really new in lighting is about software and controls. Never has it been more important to actually experience what a fixture can do. Innovation in lighting today means revolutionary functionality and programming, not cosmetic upgrades.

Going forward, it will be interesting to see how the lighting industry as a whole embraces the Internet of Things, not only in terms of product discussions, but educational opportunities. One gets the sense that the Internet of Things is lighting's new buzzword.

As the industry enters a broader discussion of networks and data, audience expectations are changing when it comes to content at events and in the media. The lighting community as

> **"We're still in the early days, as the lighting community figures out what connectivity really means in terms of project applications and the integration of different fixtures and building systems."**

a whole will have to figure out how to recast familiar product presentations and technical forums in order to meet the demand for cutting-edge information.

Ultimately, lighting is much more than a light source fitted around a housing. The exact shape of the industry's future is emerging as we speak. Regardless of the disruptions that the Internet of Things may bring to business or technology, I am confident that the lighting industry will be able to distinguish valuable solutions from gimmicks, and stay focused on illumination and the core values of quality and innovation.

Elizabeth Donoff, Editor-in-Chief
edonoff@hanleywood.com

LIGHT DEFINES THE EXPERIENCE

For Janet Echelman's monumental sculpture on the Boston Greenway, Arup used Lumenbeam Grande luminaires to heighten the colorful, nighttime presence.

Janet Echelman Sculpture, Boston Greenway, MA

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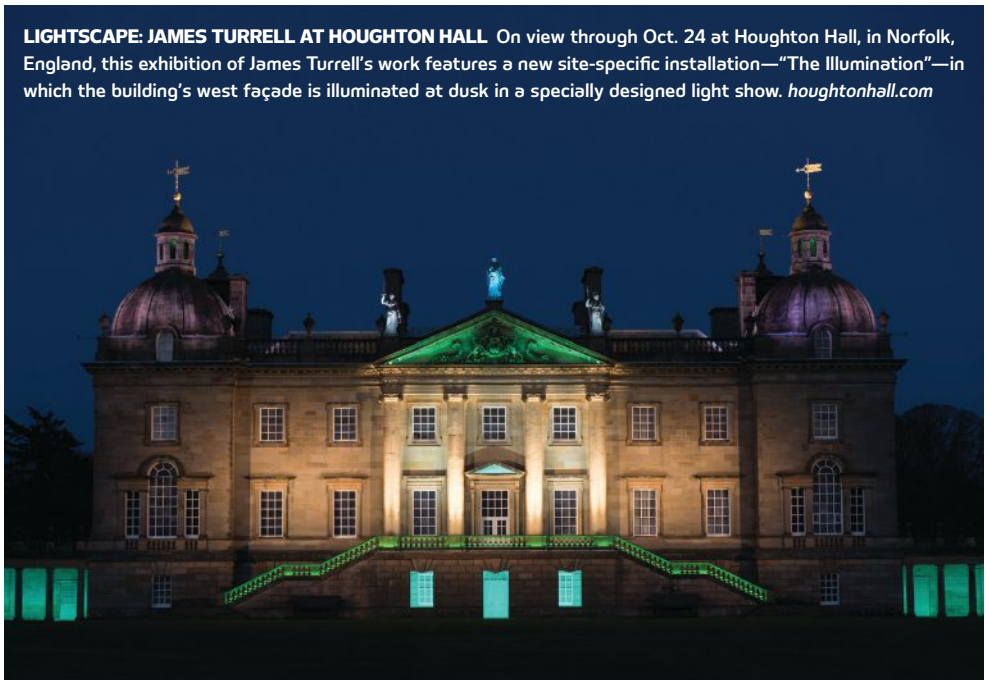

LIGHTSCAPE: JAMES TURRELL AT HOUGHTON HALL On view through Oct. 24 at Houghton Hall, in Norfolk, England, this exhibition of James Turrell's work features a new site-specific installation—"The Illumination"—in which the building's west façade is illuminated at dusk in a specially designed light show. *houghtonhall.com*

RITA HARROLD RETIRES

The Illuminating Engineering Society announced that, after 23 years of service, Rita Harrold retired on June 30. Harrold served as the society's 81st president from 1985 to 1986, the first woman to hold the title. In 1992, she joined the society's staff as director of educational and technical development—now referred to as director of technology. Over the course of her career, Harrold served as the society's principal liaison to the lighting industry, developed its educational program offerings, and oversaw the preparation and production of hundreds of technical documents and standards through to publication. •

Read the full article online at bit.ly/ALRHarrold.

LIGHTFAIR 2015 RECAP

text by Elizabeth Donoff

Lightfair, the lighting industry's annual trade show and conference, was held this year from May 3 to May 7 in New York at the Jacob K. Javits Center. According to event producer AmericasMart (AMC), the trade show achieved a record 29,900 registered attendees (up 15 percent from 2014), 599 exhibitors, and 268,580 net square feet of exhibition space. Of the exhibitor total, 108 companies were there for the first time and 110 companies came from outside of the United States.

In addition to the trade show, the event featured an educational lineup of workshops, seminars, and keynote speakers, as well as a new Controls & Connectivity Forum. (Read senior editor Wanda Lau's report from this forum, "The Future is in Lighting Controls," on page 17). In all, 198 hours of educational content were presented via 78 accredited courses.

On the products front, the annual Lightfair Innovation Awards, in its most streamlined presentation to date, gave attendees a good preview of what awaited them on the show floor. Read associate editor Hallie Busta's detailed look at the 2015 winners on page 36.

And while there were a number of new fixtures on display, many of the product introductions focused on software that allows lighting to take on a dynamic range of control options from color tuning to managing entire illumination systems.

The pulse of this year's show and the state of the lighting industry is captured in ARCHITECTURAL LIGHTING's second annual installment of videos from Lightfair. The first video (*bit.ly/ALLightfair2015*) is an overview, and in the rest we speak with industry executives who share their thoughts on how they see their companies in the lighting marketplace amidst continued lighting technology developments. This year, we spoke with the following people:

- Maryrose Sylvester, President and CEO, GE Lighting *(bit.ly/ALLightfairGE)*
- Jes Munk Hansen, President and CEO, Osram Americas *(bit.ly/ALLightfairOSRAM)*
- Amy Huntington, President, Americas, Philips Lighting *(bit.ly/ALLightfairPhilips)*
- FX Souvay, President and CEO, Lumenpulse *(bit.ly/ALLightfairLumenpulse)*

Lightfair, always a valuable resource, particularly in terms of industry networking, will take place in San Diego next year. Show dates are quite early: April 24–28, 2016. For details go to *lightfair.org*. •

Top: Hugo Glendinning. Image courtesy of the artist and Houghton Hall.; Bottom: Lauren Honesty

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MAINTAINING LIGHTING QUALITY WITH LEDS

In response to "LEDs Make Inroads into Streetlighting" (Jan/Feb 2015), Jim Benya urges the lighting community to focus its attention on LED lighting quality, lest a dangerous precedent be set that ignores color temperature and makes way for glare in the name of energy efficiency.

For me, LED lighting has now surpassed all expectations. For years, I wondered whether manufacturers would develop sources and luminaires with enough power for commercial lighting and, to my amazement, those now exist. Even sports lighting, one of the most demanding applications in terms of both controlled candlepower and raw lumens, is now possible. As a result, I am finally telling my clients that all-LED lighting represents the best lighting investment they can make, even if it costs a little more than legacy systems.

For good reason, LED lighting has been heavily promoted for both its energy efficiency and long life, as well as for convenient dimming, color temperature tuning, and more. But one rarely hears of LED products touted for their lighting quality. To the contrary, I think we've been far too lenient about quality deficiencies that many LED products introduce.

In my opinion, lighting quality begins with white light source color. With solid-state lighting, there are only three practical ways to make white light: phosphor with a blue pump, phosphor with a violet pump, or a combination of narrow-band LED sources (RGB, RGBA, etc.). The most common are blue pumped, but any of these are capable of producing white light. As a general rule, the quality of the white light is inversely proportional to the efficacy (lumens per watt) of the source. The difference in efficacy between an 80 CRI LED and a premium 95-plus CRI LED can be 25 percent to 30 percent; between a 65 CRI LED and a 95-plus CRI LED, a whopping 40 percent to 50 percent.

When efficacy wins, color quality suffers. The highest-efficacy white LEDs produce little to no red, little to no cyan, an abundance of green, and an over-abundance of blue. Blue worries me most for environmental reasons, because the presence of abundant blue signals daytime to the circadian system. Other color defects, such as unacceptably poor color rendering of critical tasks is also of concern.

After selecting the source, I look for the ability to control the light. The vast majority of LED devices emit a semi-Lambertian distribution—what we technically call a blob. A lot of simple luminaires add nothing more, resulting in a fixture that throws light everywhere in front of it. Not surprisingly, these luminaires produce the most lumens per watt. For proper lighting design practice, this is generally unacceptable, as specific candlepower and beam shape is needed to do almost everything right. Unfortunately, beam quality is not a criterion on the DesignLights Consortium Qualified Products List. Efficiency and low cost will appeal to far too many, I'm afraid.

The third issue I then focus on is flicker. During the magnetic ballast era, we learned that flicker associated with fluorescent and high-intensity discharge lighting was bad. It caused headaches and its stroboscopic effects could be dangerous in an industrial workplace. Why, all of a sudden, is blatant flicker now casually ignored? Have humans evolved, or is it too hard to eradicate it from LED lighting?

But the biggest potential problem with LEDs, by far, is glare. The on-axis luminance of a bare, modern, high-power LED exceeds 100 million cd/m² (nits), and each year products get brighter, so we can expect higher values in the future. The luminance of the sun at noon is 1.6 billion nits, making bare LEDs now about 1⁄16 of the brightness of the sun (and getting brighter). LEDs are typically arranged into a grid in order to reach the total lumen output desired. By any glare formula in the world, their glare vastly exceeds the maximum acceptable luminance of any light source, for any reason.

We can solve this problem of glare with a combination of shielding, refraction, diffusion, indirect lighting, and illuminating adjacent surfaces to reduce contrast. Quality luminaires do some or all of these. But the vast majority of LED products worldwide do nothing but produce excessive brightness over a wide field of projection. I've taken to describing the effect "pincushion glare" to call attention to the extreme brightness of individual LEDs. Each LED image is focused onto the retina and some individual cones will be overdriven to the point of pain. As an added insult, the excessive blue of many LEDs severely overdrives the blue cones, causing hypoxia, resulting in temporary blindness, long-lasting afterimage, and, for most people, a glare reflex.

What can we do? With the overarching emphasis on energy efficiency on which LEDs feed, suggesting better LED luminaires with fewer lumens per watt may be seen by some as heretical. But, now that the sources have become so efficient, perhaps it is time to rethink the quality compromises made in the name of efficiency, and to stop the race for the bottom before good lighting design practice is the loser.

James R. Benya, PE, FIES, FIALD
Benya Burnett Consultancy, Davis, Calif.

Lighting Design: Jacobs Engineering Group, Inc., Fort Worth, TX
Photographer: Thomas McConnel

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REPORT

THE FUTURE IS IN LIGHTING CONTROLS

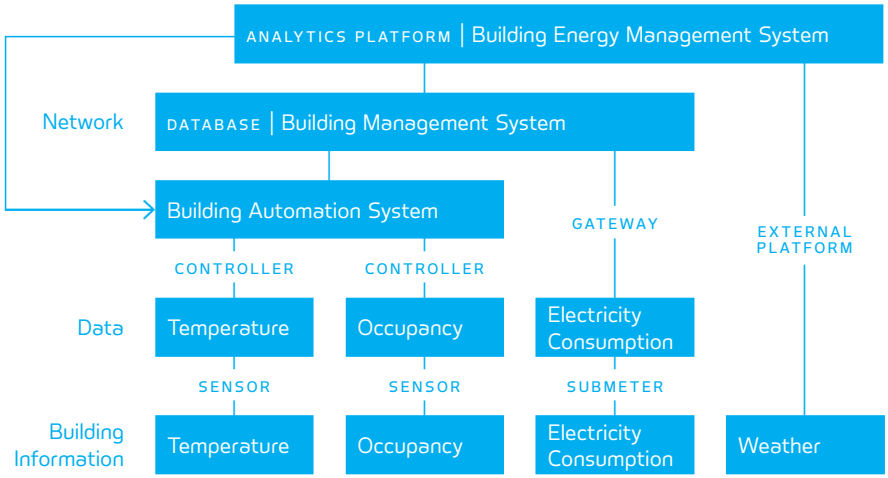
The potential of the Internet of Things inspired attendees at Lightfair's Controls & Connectivity forum.

text by Wanda Lau

The technology to create buildings that can self-optimize their energy performance, ensure user comfort, and diagnose maintenance needs is here. Now the lighting industry is catching onto the vital role that this networked future will play, as the potential stretches beyond singular buildings to encompass entire cities.

For the past decade, the buzzwords Internet of Things (IoT) and Industrial Internet of Things (IIoT) have been floating around, as

Generic Building Data Flow



A typical building control system uses data collected from sensors and submetering to inform a building management system, which can help monitor a facility's energy use.

smart products such the Nest thermostat and wearable fitness devices captivated consumers. In the IoT, everyday objects are outfitted with sensors, microprocessors, and the ability to talk to other machines over a local system. In the IIoT, objects networked together collect swaths of data for analytics, information management, and knowledge transfer to optimize large-scale systems, such as buildings, factories, highways, and cities. (For this article, IoT will be used to collectively describe both concepts, which are beginning to converge in both vision and practice.)

The opportunities for the lighting industry are immense. Luminaires, which essentially see every square inch of habitable space, are an obvious media in which to host the sensor and video technology that can turn the world into a virtual databank. With state legislation, building codes, and standards such as Part 6 of California's Title 24, New York City's Local Law 88, and ASHRAE Standard 90.1 compelling businesses to retrofit luminaires with LEDs, the opportunity to upgrade from conventional controls—on–off, occupancy, and dimming—has never been more obvious. "It would be a shame to put in systems that are single purpose," says Tanuj Mohan, founder and chief technology officer of Enlighted, a Sunnyvale, Calif.–based technology company that exhibited at Lightfair. "You'd be missing the opportunity to make your buildings truly smart. Since the biggest cost is labor, if you put the wrong sensor and platform in, then you are [stuck] for the next 10 to 20 years."

THE ARCHITECTURE OF THE IOT

Powering the IoT is a complex physical and virtual network. At the consumer interface are sensors, data collectors that are capable of capturing everything from ambient light levels to video, audio, temperature, carbon dioxide levels, and more. They can be integrated into luminaires during original manufacture or wired in as a retrofit component. For instance, the NetSense Node sensors by Sensity Systems, in Sunnyvale, Calif., can plug into any LED fixture with a standard electrical outlet.

To relay the data to the Internet, the sensors must be addressable. With the tech industry predicting 50 billion devices in the IoT space by 2020, it will become cost prohibitive to assign IP addresses to every sensor and manage the IP-related network, says Sohrab Modi, chief technology officer and vice president of engineering at Echelon, a controls company in San Jose, Calif. Instead, sensors can be networked using power-line communications and wireless standards, such as ZigBee. In turn, those networks can "rely on gateways and routers to forward information beyond their own networks," Modi says.

The sensors must then deliver the information they collect via a communications protocol. The IT world converged on TCP/IP and Ethernet in the late 20th century, Modi

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says, but a standard for the IoT space remains up for grabs. Contenders to date include ZigBee, Bluetooth, Wi-Fi, and Z-Wave. The different communications-transfer methods vary in speed, bandwidth, security, reliability, and range.

Gateways allow information coming from different channels to communicate with each other and moreover with an Ethernet, IP, or Web-services network that then allows a computer or human to access, manage, and control the data, Modi says. If the network has an open API (application programming interface), third-party developers can create apps that utilize the data.

IOT APPLICATIONS IN BUILDINGS

The technology behind the IoT is ahead of what the market is ready for, says Noah Goldstein, a San Francisco–based research director for Navigant Research who presented the study *Intelligent Buildings and Big Data* at Lightfair with Greg Walker, research director of the Continental Automated Buildings Association (CABA), in Ottawa, Canada. Converting a building's lighting system to LEDs is still a relatively new movement. However, in terms of the IoT, "Lighting is not only the low-hanging fruit, but the fruit that's already on the ground," Walker said.

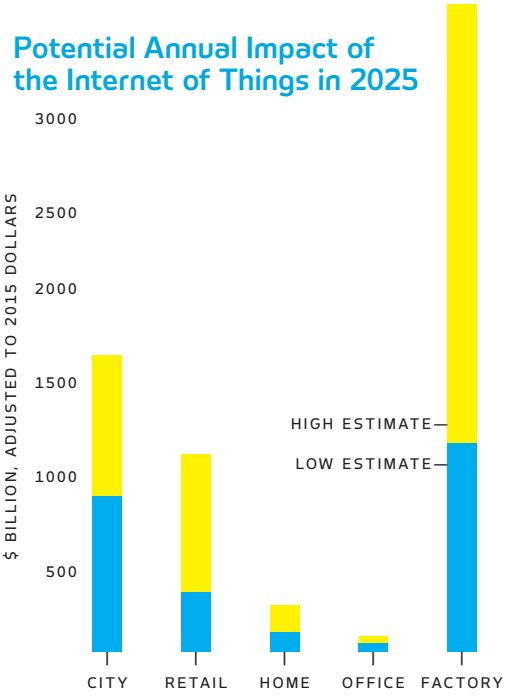
The study, completed in February, was commissioned by CABA to identify potential facility-, business-, and energy-management uses for big data, such as building automation, capital planning, and predictive maintenance. The market for big data–related software, hardware, and services for buildings is forecasted to climb to $512 million by 2020, three times this year's projected revenue of $171 million, Goldstein says.

Beyond direct sales of IoT products and services, the June 2015 report *The Internet of Things: Mapping the Value Beyond the Hype* by the McKinsey Global Institute estimates the annual economic impact of intelligent energy management savings as between $50 billion and $110 billion for homes, and between $12 billion and $21 billion for offices by 2025. These values assume a conservative 20 percent reduction in overall energy use. Using the IoT in safety and security applications raises these numbers by $15 billion to $20 billion.

The IoT is already being used in these building applications, but in silos rather than in an integrated fashion, Walker said. The current paradigm of imbuing isolated components or a single building system, such as lighting or HVAC, with intelligence may generate a 5 percent to 20 percent savings in energy for that particular system, said Stephen Selkowitz, the senior adviser for building science at Lawrence Berkeley National Laboratory (LBNL), during the forum. However, an approach that uses multisystem energy-efficiency measures can result in 30 percent to 50 percent in savings across the whole building. These significant measures will be necessary to realize high-performance, net-zero-energy buildings.

Sensors and advanced controls are part of the crucial first step. "If you don't know the performance of something, how are you going to manage it?" Selkowitz asked. As more building components go online, intelligent control systems will become more accessible to consumers, said LBNL staff scientist Eleanor Lee. Similar to computer hardware in the IT space, the cost of sensors is decreasing while their data-collecting and communication capabilities are increasing. As the gap between IT and operational technology narrows, the plug-and-play interoperability of computer hardware—for example, self-discovery and automatic device configuration—will be imparted to lighting controls and sensors.

Several pilot programs and full-scale test beds are underway to determine the effect of smart controls in building systems. At LBNL's FLEXLAB, in Berkeley, Calif., Lee is leading the High Performance Active Perimeter Building Systems project, which field tests and



The McKinsey Global Institute estimated the annual economic impact of IoT applications in different settings in their 2015 report *The Internet of Things: Mapping the Value Beyond the Hype.*

McKinsey & Co. / McKinsey Global Institute

evaluates the interoperability and performance of shading, daylighting, and lighting systems.

The nonprofit organization Building Energy Exchange (BEEx) in New York is monitoring several demonstration sites to quantify the impact of advanced lighting and shading controls in retrofit commercial high-rises. Citing the 2010 report *Energy Efficiency Potential Study for Consolidated Edison Co. of New York, Inc.*, in his Lightfair presentation, BEEx executive director Richard Yancey said that interior and exterior lighting systems use 32 percent of the electricity consumed by commercial buildings in New York (related cooling expenses use an additional 17 percent).

BEEx and LBNL are now studying occupied office buildings in New York. Using so-called "state-of-the-shelf" lighting and shading controls technology, the Living Lab Demonstration Project will measure the energy savings and well-being of occupants at the Bank of America tower at One Bryant Park and at Goldman Sachs' headquarters at 200 West Street. Demonstration programs as these will help accelerate the learning and adoption curve of intelligent, integrated building controls by documenting their outcomes for owners, installers, designers, and manufacturers.

THE IOT BEYOND BUILDING AUTOMATION

Retail is the most immediate proving ground for the IoT, Goldstein says. Intelligent lighting systems can be used to match customers' virtual browsing preferences to areas in a store and provide relevant discounts, product recommendations, and wayfinding tips. They can also help deter shoplifting and expedite customer checkout and payment.

The IoT can even influence the customer experience before any shopping begins. At Lightfair, Sensity's CEO Hugh Martin and Simon Property Group vice president Edward Sayers discussed how the IoT will help patrons find parking spaces and illuminate paths to their cars at night. The companies are also developing apps together, says Sensity senior director of product marketing Joel Vincent. One such app will visually monitor pavement discoloration to provide early identification of parking-lot maintenance issues. "[Simon Property] had a list of 90 application ideas, which we narrowed down to 10 or 12," Vincent says. "This highlights the philosophy of having an [open] platform where we provide APIs and let people who understand what the system and data can do work with our development team."

With 4-billion-plus fixtures lining highways, roads, and sidewalks worldwide, Martin said, the opportunities for the IoT to influence everyday life—traffic, mass transit, water and air quality, and public safety—are endless.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HURDLES FOR A WIDESPREAD IOT

For the IoT to become mainstream, several digital, physical, and psychological hurdles must be overcome. Unreliable equipment and slow network transmission speeds remain legitimate concerns, and the question of a standard communications protocols for IoT devices in the building space has yet to be resolved.

So what can lighting designers and specifiers do now? They have to demand products and systems that mimic the IT world, Lee said. Sensors, switches, and devices should move toward IP-enabled devices that can operate on standard transmission mediums, such as Wi-Fi, Bluetooth, and Ethernet. Open APIs would also transform "lighting into an application platform" similar to smartphones, Vincent says.

And the issues of data security and individual privacy must certainly be addressed. Vincent says that Sensity takes a layered approach to security. Devices that have access to personal information are secured physically—and the data itself is heavily encrypted; at the network level, authentication protocols such as passwords are used. Enlighted also employs password-based authentication for its networks. "Access control is limited by the users and their roles and domains," vice president of business development Zach Gentry says.

"Privacy is part and parcel to [data security]," Vincent says. The information collected by Sensity's network is short-lived, he says. "This isn't a dropcam-style video camera where we're streaming data constantly and archiving it. We store data for as long as it makes sense for us to do the analytic that the application requires." (However, an end user may choose to develop an API and data management system to store information about their particular site.) Vincent adds that software developers who want to use Sensity's data must sign up for its developer program, abide by the company's privacy policy, and describe how they intend to use the data.

But even though the data on a building's energy use and occupant comfort can be collected, Navigant Research and CABA found in their study that many facility managers do not understand its potential because they haven't used analytics in the past. Goldstein says prospective IoT vendors must be direct in their pitch, "articulate the value propositions, and not talk in scientific or statistical terms. Rather, they should say, 'We will help lower your maintenance cost, and here's how.' "

The study also found that money is the most important factor in whether an owner decides to upgrade a building. Goldstein says the return on investment for a building automation system can range from near-instantaneous—for example, a commercial facility operating at full tilt on weekends—to about three years for a building being managed by a third-party, to roughly five years for an owner-operated building. Furthermore, he says, "what the data analytics can bring isn't just bottom-line cost savings in energy, but also operational savings, which is a harder number to calculate because it hits so many different parts of the facility."

Enlighted's Gentry says that the big-picture cost of upgrading a lighting system with IoT sensors is comparable to or less than the cost of a conventional controls system. While more hardware is required—a sensor on every luminaire in the IoT, instead of a single sensor per group of luminaires—the time saved in labor, set up, and ultimately in improved operations can more than make up the initial hardware premium, he says. "Architects and specifiers should make sure the systems that go into buildings are leveraging what technology has enabled today." •

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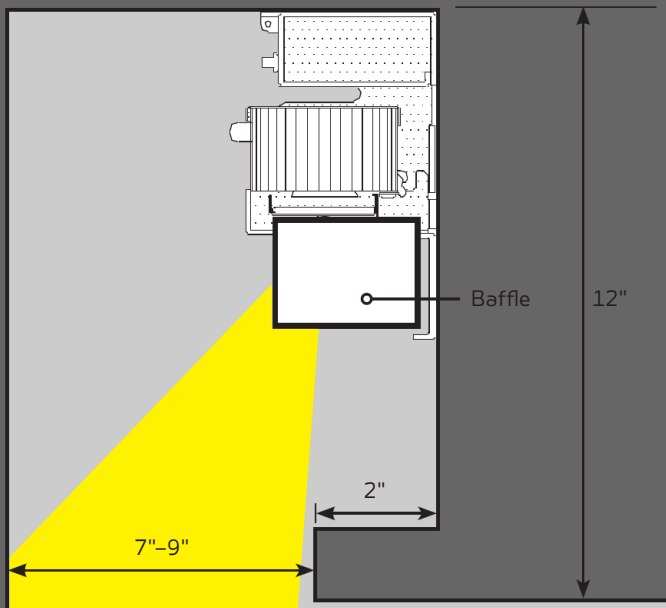

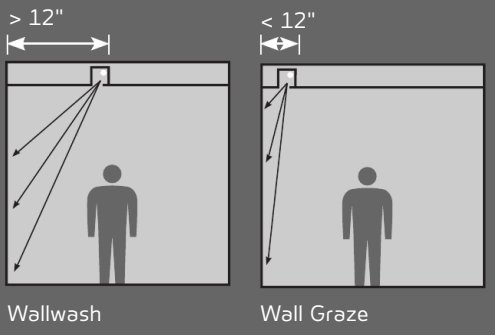

Lamp spacing between fixtures should be equal to the distance the fixtures are placed away from the wall.

IN FOCUS

WALLWASHING AND WALL GRAZING

Fixture placement is the key factor for this nuanced lighting technique.

text by Elizabeth Donoff

Illuminating a wall can be done in one of two ways: wallwashing or wall grazing. The distinction between these two core lighting details is the fixture's distance from the wall surface. In a wallwash detail, the luminaire is typically a minimum of 12 inches away from the wall plane, allowing for an even application of light that gives the wall texture a flat appearance. In a wall grazing detail, the fixture is positioned very close to the wall (no further away than 12 inches) in order to highlight and bring out the wall texture. The overall height of the wall informs the luminaire's distance from the wall. •

THINGS TO CONSIDER FOR WALL LIGHTING:

1. The human eye has an easier time deciphering vertical surfaces than horizontal surfaces.
2. Illuminated vertical surfaces are most successful as an indirect lighting solution when the surface has a light-colored, matte finish.
3. Dark colors and specular surfaces, such as polished stone, are difficult to illuminate.
4. Illuminated walls can be a source of glare.

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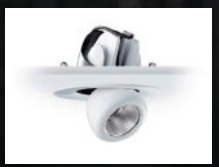

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Thanks to LED lighting specified, the signature yellow and purple of the Lakers' uniforms pop when the team plays at the Staples Center in Los Angeles.

TECHNOLOGY

THE EVOLUTION OF WHITE LIGHT

New color rendering metrics and technologies are addressing lighting quality issues for LEDs.

text by Timothy A. Schuler
source photo by Keith Allison/Creative Commons/flickr

Daylight during the sun's zenith—in which each wavelength in the visible color spectrum comes together—is the paragon of white light. As recently as five years ago, finding LED products that delivered uniform white light with consistent color rendition was difficult. "Just getting a decent white light was an issue," says Glenn Heinmiller, a principal at Lam Partners, in Cambridge, Mass.

Today, manufacturers have a number of strategies for producing solid-state lighting

(SSL) with color rendering index (CRI) values that surpass 80, and are harnessing the latest science to target specific color points for custom uses. Institutions, including the Lighting Research Center (LRC) in Troy, N.Y.; the Illuminating Engineering Society (IES); and the University of British Columbia have proposed new color rendering metrics more attuned to the unique, digital characteristics of LEDs.

THE STANDBY

CRI, developed by the Commission Internationale de l'Eclairage (CIE) in the 1950s and approved in 1964, remains the standard for measuring color performance despite a consensus among many lighting designers and manufacturers of its inadequacy for solid-state lighting. "Color science has progressed a lot since then," says Michael Royer, a lighting engineer with the Advanced Lighting Team at the Pacific Northwest National Laboratory (PNNL), in Richland, Wash. The metric uses eight pastel color chips from the Munsell color set (named after painter and art professor Albert Munsell), which Royer says can create an undesirable sensitivity in the metric and allow manufacturers to manipulate the system by targeting those colors. (Six additional color chips are used to provide supplementary information about the light source.)

In 2012, the National Institute of Standards and Technology developed the Color Quality Scale (CQS), which Royer says made only modest improvements to CRI. CQS uses 15 color chips and CIE's 1976 color space—a chromaticity diagram that maps the color spectrum—that has a slightly modified lightness scale from the 1960 color space.

In 2014, in response to the increasing market share of SSL, the LRC established Class A Color. To be considered Class A, a luminaire must have a CRI higher than 80; a consistent chromaticity, or hue; and a gamut area index (GAI) between 80 and 100. GAI compares a source's gamut area—which indicates how saturated an object's colors appear—to that of a reference source. Unlike CRI, GAI can exceed 100.

THE NEWCOMER: TM-30

This summer, the IES is expected to approve TM-30, *IES Method for Evaluating Light Source Color Rendition* as a new way to evaluate color rendition in LEDs. Developed by a task group chaired by Royer, the method was also submitted to the CIE for consideration as the new international standard.

TM-30 uses 99 color evaluation samples, drawing from leaves, flowers, skin tones, paints, and some of the original Munsell chips. It spans the entire color space, including saturated and desaturated colors, and introduces new metrics for fidelity (R_f) and gamut (R_g). Similar to CRI, an R_f of 100 indicates a perfect match with the reference. R_g is calculated by plotting a light source's chromaticity values in a color space and comparing the area to that of a reference source. "If R_f is 100 ... R_g must also be 100," wrote New York–based Studio T+L principal and IES Color Committee member Jason Livingston on his website, Designing Light. "As the R_f value falls, the potential range of R_g above [or] below 100 (indicating an increase or a decrease in saturation) grows."

Much of the thinking behind CQS and Class A informed TM-30, Royer says. His task group, however, took issue with GAI because it relies on the same set of color samples as CRI as well as on the equal energy spectrum, a theoretical source that emits the same amount of energy at every wavelength. "Thus," he says, "GAI and CRI do not work as well together as a system since a given source will be compared against different references for the two measures."

Though Lam Partners' Heinmiller is anxious for a replacement for CRI, he acknowledges that most designers don't have time to research what these new scores mean. "Once [the new metric is] established, the manufacturers will pick up on it and test to it, and then we can all start using that." Until then, he says, most designers will continue to look to CRI for guidance.

THE PREFERENCE FACTOR

One thing Class A and CQS attempt to measure, which TM-30 does not, is human preference. Research has shown that people sometimes prefer light that renders colors more vividly—that is, with a higher gamut area than the reference source. And the LRC has found that when it comes to white light, human preference does not always follow the blackbody curve.

In its 2011 paper "Perceptions of White Light Sources of Different Color Temperatures," the LRC found that humans perceived untinted white illumination with chromaticities that map to an "S"-curve rather than the smooth arc of the blackbody curve. Perceptions of white light at and above 4000K fall just above the blackbody curve and have a greener tint, while perceptions of white light below 4000K fall just below it and are slightly more pink. Historically, these subtle tints were viewed as imperfections but, as the research suggests, they may be preferable at certain color temperatures or for certain situations. The term "whitebody curve" has informally emerged to describe these differences, says Ken Bruns, a controls product manager at Lumenpulse.

"Going beyond the blackbody is exciting," says Maria Topete, director of applications engineering at Bridgelux, because it raises questions about which characteristics make a

The eight test color samples used to calculate CRI (left) and the 99 color evaluation samples used to determine TM-30 (right), which is pending review by the IES. The colors shown here are approximations.

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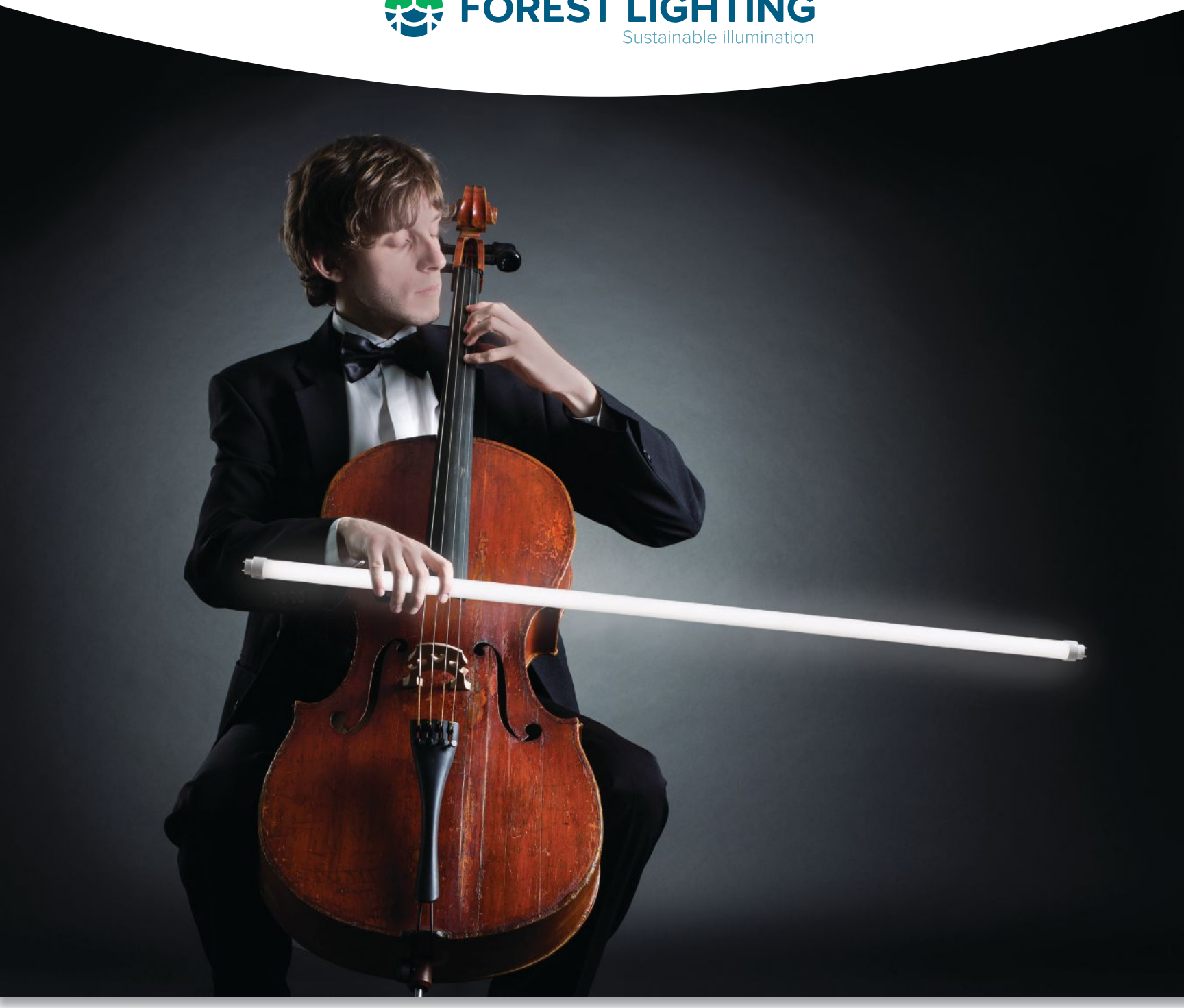

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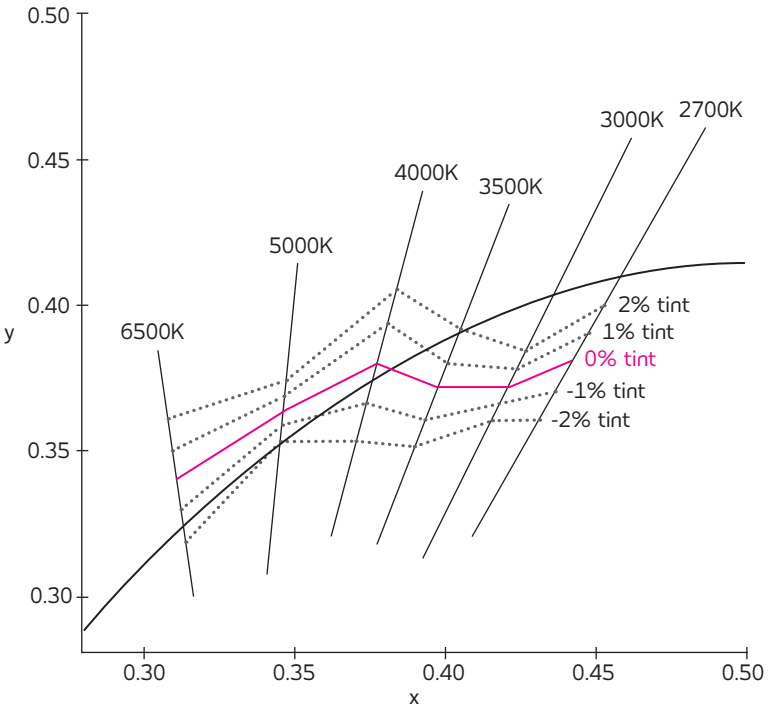
Perception of White Illumination



Perceptions of white illumination deviate slightly from the blackbody curve depending on the light source's correlated color temperature.

WhiteOptics' aluminum product (upper portion of photo above) reflects up to 98 percent of light and diffuses hotspots, as compared to a standard finish.

particular type of white light desirable. "The vernacular to talk about [people's preferences] and the ability to quantify those characteristics are evolving."

OPTICAL OPTIMIZERS

As lighting metrics evolve in conjunction with the increasing prevalence of SSL, the quality of white LED light is approaching the standard embodied by daylight with the advent of several new and updated technologies.

Typically, manufacturers designing a high-CRI white LED luminaire must find a balance between diffusion and reflectance. Diffusers typically lessen a luminaire's efficacy, whereas high-reflectance surfaces increase output but can create hotspots and glare. "If you have a bunch of LED dots bouncing off a specular surface, it's going to look like an arcade or a '70s disco," says Eric Teather, president and founder of WhiteOptics.

A spin-off from DuPont and developed in partnership with the U.S. Department of Energy and the University of Delaware, WhiteOptics, in New Castle, Del., makes patented composite materials that allow for up to 98 percent reflectance while offering a ratio of particles and microvoids that scatter light so that the optic artifact—the beam itself—is diffused. This allows an original equipment manufacturer to maintain a high lumen output and color quality while diffusing the reviled LED dots.

White rendition, or how well an LED renders a white object, is often overlooked as a measure of color quality. Optical brighteners, chemical compounds that make objects appear brighter and whiter, are embedded in everyday products, such as apparel and printer paper. The brighteners work by absorbing and then remitting ultraviolet and violet light as longer-wavelength visible light, which adds a blue tint.

Also known as fluorescent whitening agents (FWAs), optical brighteners have been in use for decades. Last year, they made headlines following the study "Whiteness Perception Under LED Illumination" (*Leukos*, April 2014) by Kevin Houser, a professor of architectural engineering at Penn State University (and a member of ARCHITECTURAL LIGHTING's editorial advisory board). Houser tested the fluorescence of optical brighteners under a halogen lamp, a violet-pumped LED (a white source that uses a violet-emitting LED), and a blue-pumped LED. While the first two performed in a similar manner to incandescent light, the blue LED failed to activate the FWAs, and the products appeared dingy and yellow.

"The results indicate that engineering of an LED source's spectrum is necessary for an accurate rendering of whiteness," Houser wrote. This research has spurred manufacturers, including Soraa and Lumileds, to develop violet-pumped LED arrays that will render white objects such as paints, appliances, and fabrics as their makers intended.

COLOR AND THE REAL WORLD

Color performance can make a significant difference in healthcare environments, where the tone of a patient's skin can inform a diagnosis, and in museums, where works of art can be damaged by low-quality light. But where

Left: Mark S. Rea/Lighting Research Center; Right: WhiteOptics

it really garners interest is in retail applications. The quality of light can affect a shopper's experience and, moreover, their decision to make a purchase.

When Aaron Merrill, the senior director of channel marketing at Bridgelux, was recently leaving a grocery store near his company's headquarters in San Francisco, he observed: "In the checkout aisle, all the candy bars were illuminated with LEDs. All the colors were popping, and I couldn't keep my kids [away]."

Similarly, the LED lighting used at the Staples Center in Los Angeles was developed in direct response to the colors of the Los Angeles Lakers' uniforms. "The [owners] wanted specific color points that [made] the yellows and the purples pop, and something that looked good on high-def television," Merrill says.

But even custom LED lighting still remains subject to the whims of human preference. Merrill points to the example of a luminaire in Europe developed specifically to display bread. Responses to the light varied by region, he says, a reminder that the measure of light quality goes beyond what can be measured in numbers and indexes. "There's a whole new world of behavioral science still to be discovered." •

RESOURCES

A list of references that discuss color metrics and white lighting.

"Class A Color Designation for Light Sources Used in General Illumination," by Jean Paul Freyssinier and Mark S. Rea, *Journal of Light and Visual Environment*, 2013. Available at: *bit.ly/1gK223S*.

"Whiteness Perception Under LED Illumination," by Kevin W. Houser, *Leukos*, 2014. Available at: *bit.ly/1fYqSNr*.

"Perceptions of White Light Sources of Different Color Temperatures," by the Alliance for Solid-State Illumination Systems and Technologies and the Lighting Research Center, 2011. Available at: *bit.ly/1LngV9b*.

"TM-30 and Color Gamut," by Jason Livingston, Designing Light, June 2015. Available at: *bit.ly/1Mknc5U*.

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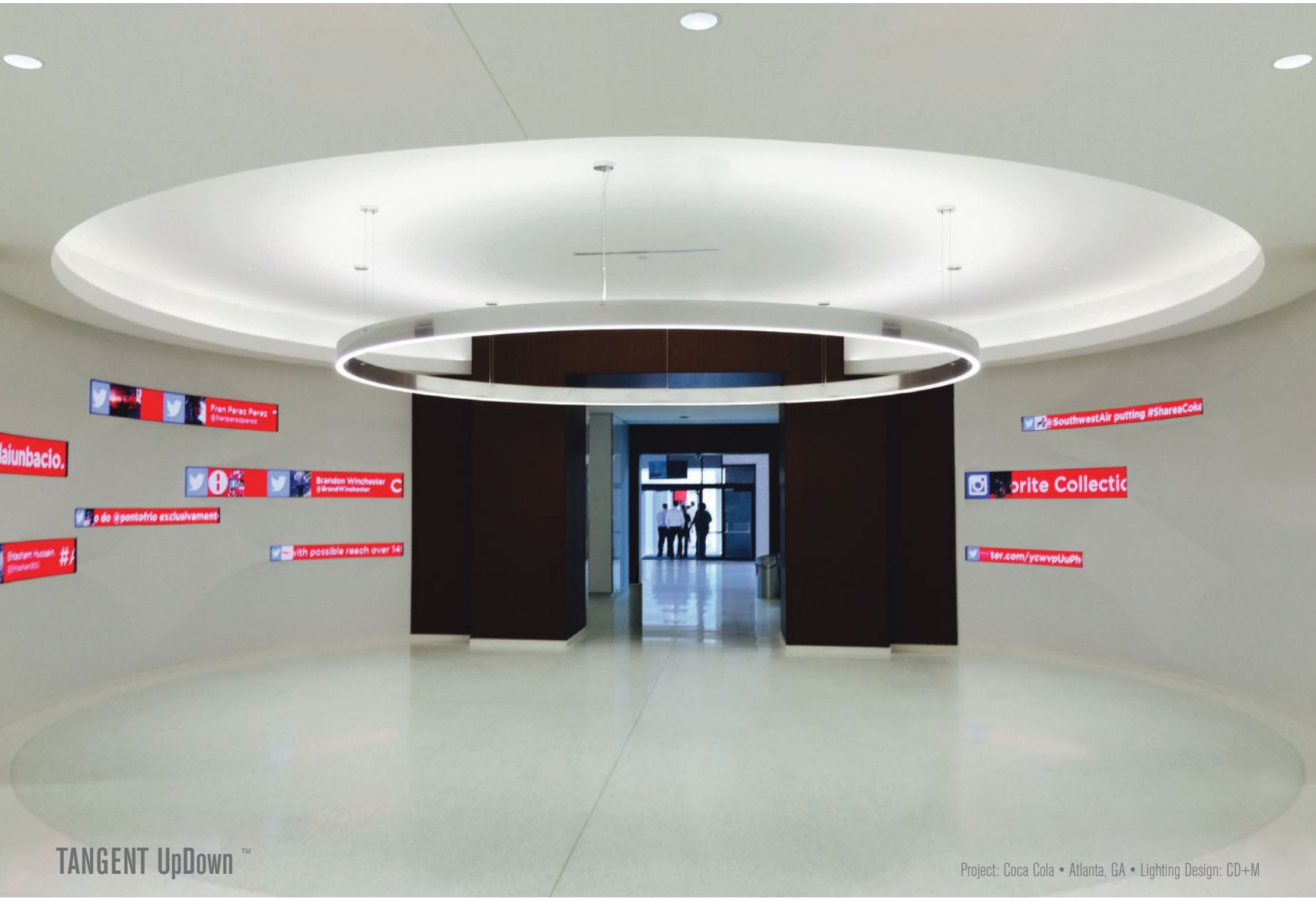

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THE 2015 LIGHTFAIR INNOVATION AWARD WINNERS

This year's top products enhance designers' and end-users' control of lighting.

text by Hallie Busta

Once again, the Lightfair Innovation Awards kicked off the eponymous trade show, which is in its 26th iteration and was held this year in New York City from May 5 to 7. The program received 285 product submissions from more than 150 manufacturers across 14 product categories. The winners—one per category, with three of those also selected for the program's top honors—show how manufacturers are expanding the capabilities of solid-state lighting by incorporating sophisticated controls and tunable white and color technology, all while streamlining fixture form factors.

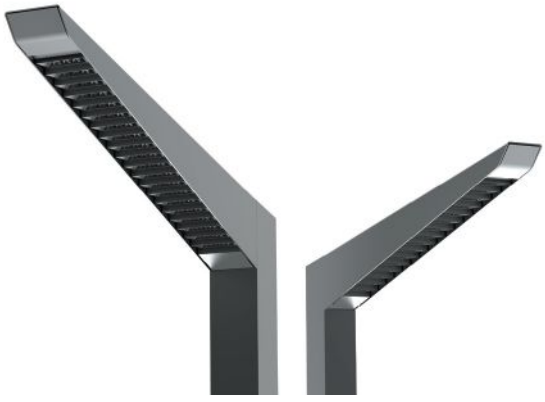
The entries were reviewed by a jury of lighting professionals: Geoff Bryden, from Gabriel Mackinnon Lighting Design; Peter Jacobson, from ConEdison; Mark Loeffler, from Atelier Ten; Karen Murphy, from HDR; Robert Newell, from Robert Newell Lighting Design; Brandon Thrasher, from Impact Illumination at Henderson Engineers; and Howard Wolfman, from Lumispec Consulting.

The following products received the competition's three highest honors:

MOST INNOVATIVE PRODUCT OF THE YEAR

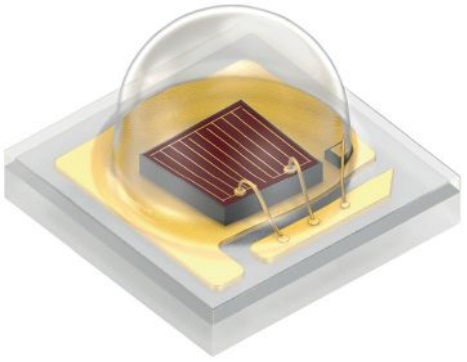
OmniPoint, Osram • This remote-controlled, LED array-based downlight was also named the winner in the category of Recessed Downlights (Wall Washers, Directionals, Modulars, Multiples). OmniPoint users can wirelessly configure the luminaire's output and beam angle, shape, and distribution using a companion Android or iOS app. Available in 3000K with a CRI of 90-plus, the fixture is suited for retail, museum, hospitality, theater, and other applications requiring reconfigurable illumination. An optional Wi-Fi camera lets users view the luminaires installed in the space in real time. The jury recognized the fixture for its ability to develop unique photometrics from a single point-source for improved optical control. • *osram.com*

DESIGN EXCELLENCE AWARD



Kick, Hubbell Lighting/Architectural Area Lighting • This contemporary outdoor fixture was also named the winner in the category of Parking, Roadway and Area Luminaires. Heralded by the jury for its sculptural form and clean aesthetic, the pathway luminaire features a stair-step optic that hides its LED array. It delivers 12,880 lumens and is available in 3000K and 4200K with a CRI of 80-plus or in 5100K with a CRI of 70-plus. With multiple mounting options—integral pole, tenon, or side mount—the luminaire has integral surge and thermal protection and is zero-to-10V dimmable. • *aal.net*

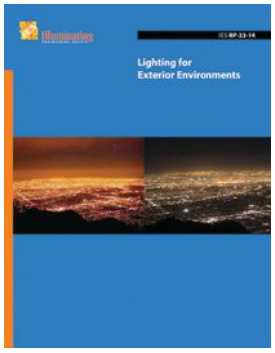
TECHNICAL INNOVATION AWARD



Oslon SLL 730nm, Osram • This LED was also the winner in the category of LED/OLED, Chips, Modules and Tape. Offering spectrally tuned light for horticulture applications, this fixture was cited by the jury for its use of light to support life in the natural world. Emitting no heat while in operation, the LED offers wavelengths of 450nm to 660nm and was most recently expanded to include a far-red 730nm option, that latter of which is intended for use with plants or flowers that have deep-red hues, such as tomatoes and roses. • *osram.com*

The following 11 products on these two pages round out the remaining 14 best-in-category winners.

RESEARCH, PUBLICATIONS, NON-CONTROL SOFTWARE AND MEASURING DEVICES



RP-33-14 Lighting for Exterior Environments, Illuminating Engineering Society (IES) • This recommended practice document has "a high probability of being a most-useful and needed publication," said juror Robert Newell, for a range outdoor product and project types. It advises on issues such as sky glow and light trespass as well as assigning lighting zones and using the Joint IDA-IES Model Lighting Ordinance and User's Guide. It also discusses community-based design and specific recommendations for lighting outdoor areas. • *ies.org*

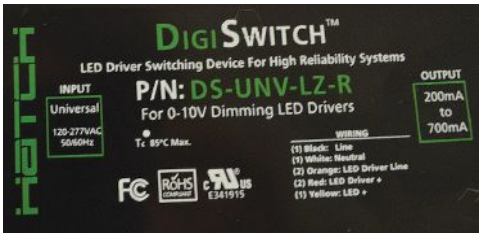
CONVENTIONAL, RETROFIT AND REPLACEMENT LED LAMPS

S38 Tunable Lamps, Ketra • Onboard wireless technology allows Ketra's S38 Tunable Lamps to provide a range of digitally addressable white, pastel, and saturated hues at a CRI of 90-plus, establishing "a new standard of color-consistency," said juror Robert Newell. Delivering up to 900 lumens, each lamp offers closed-loop color-point maintenance to less than a one-step MacAdam ellipse during its lifetime. The lamps are wireless and TRIAC dimmable to 0.1%, while their beam angles, offered from 10 degrees to 60 degrees, are programmable to specific color temperature and dimming curves. • *goketra.com*

TRACK, DISPLAY, UNDERCABINET AND SHELF

Paloma Adjustable Beam LED Trackhead, WAC Lighting • The beam angle on this fully rotatable trackhead can be adjusted from 15 degrees to 60 degrees with a simple twist, leveraging the point-source-optimal strength of LEDs. The 27W fixture delivers up to 1,600 lumens and is available in 2700K, 3000K, 3500K, and 4000K with CRIs of either 85 or 90. Its die-cast aluminum housing is offered in black, platinum, and white finishes. Available with a 120V or 277V system, the former is electronic low-voltage dimmable. • *waclighting.com*

BALLASTS, TRANSFORMERS, LED DRIVERS, SYSTEMS AND KITS



DigiSwitch, Hatch Lighting • For use with constant-current LED drivers, this switching device was heralded by the jury for its potential to double the life of the LED system it helps to control. For use with 200mA to 700mA systems with zero-to-10V dimmable drivers, it can be mounted to a junction box and can be used with recessed fixtures. Designed for use in high-ceiling applications where maintenance is a challenge, as well as in retail, museum, and non-emergency medical applications. • *hatchlighting.com*

NON-LUMINOUS COMPONENTS, SPECIALTY HARDWARE, SHADES AND SOLAR

TriGain Phosphor, GE Lighting • This family of enhanced potassium fluorosilicate phosphors is designed for use in LED-based display backlighting applications, responding to a desire for LEDs with higher values of saturated red color. TriGain uses a narrow-band phosphor to increase both the CRI and R9 levels while improving the LEDs' efficacy. Its uses range from medical to retail fixtures by using brighter reds to help make other colors render more clearly. • *gelighting.com*

INDOOR DECORATIVE (CHANDELIERS, PENDANTS, SCONCES, TASK LIGHTS)

Xterna LED Linear Suspension, LBL Lighting • Inspired by the form and function of early 20th century metal elevator gates, this linear suspension fixture can manually expand and contract from 6.4" to 76.6" in length while its combination of recessed upward and downward facing LEDs maintain light output—earning the jury's praise for its "fun ... and clean execution," according to Geoff Bryden. The 40W fixture is available in 3000K with a CRI of 80 and accepts 120V or 277V. It measures 2" thick and is offered with 12' of field-cuttable cable. White and satin nickel finishes are offered for the housing. • *lbllighting.com*

OUTDOOR LUMINAIRES—SPORTS, STEP, LANDSCAPE, POOL, & FOUNTAIN

Adjust-e-Lume with Bluetooth Wireless Technology, B-K Lighting and Teka Illumination • Pairing Adjust-e-Lume outdoor fixtures with a wireless communication system, specifiers can digitally control light output from B-K Lighting's BKSSL 8W LEDs at the fixture level. Called "another sign of things to come" by juror Brandon Thrasher for its versatile point-and-click management, the system is available in 2700K, 3000K, and 4000K. Narrow-spot, spot, medium-flood, and wide-flood beam angles are offered. Each fixture is dimmable down to 25%. • *b-klighting.com*

CONTROLS & CONTROL SOFTWARE, BUILDING INTEGRATION, SITE AUTOMATION, AND DISTRIBUTION SYSTEMS

Fresco Show WM, Acuity Brands/Acuity Controls • The jury praised the practical and technical execution of this standalone, 7" DMX512 touchscreen controller, which can be used with automated fixtures, dimmers, and relays as well as LED luminaires to manage color, positions, intensities, shapes, and timing without a computer or console. Controlling up to four DMX512 universes, the controller is mounted to a standard three-gang wallbox and integrates with button stations, contact closures, sensors, and serial inputs. • *acuitybrands.com*

DYNAMIC COLOR, THEATRICAL, COVE AND STRIPS

EcoSense Trov, EcoSense Lighting • The multitude of micro-lensing optical distributions available for this single-housing series of interior and exterior cove, grazing, and wallwasher fixtures earned this product line the jury's vote. A hinged housing with 180-degree vertical rotation lets installers orient the fixture flat, while a flexible cable allows for end-to-end connections that can be bent around curves or corners. An integral, multi-volt digital power supply detects input voltage from 120V to 277V and communicates with power-rated loads, allowing one power supply to be used across the series. • *ecosenselighting.com*

INDUSTRIAL, VANDAL, EMERGENCY AND EXIT

LED Vapor Tight, Shat-R-Shield • This LED emergency light, developed with lighting manufacturer Nicor, won the jury's accolades for its use of applied materials science in the lighting space. It uses thermally engineered polymers that resist corrosion and UV rays while withstanding moisture, dust, and salt spray. For use in harsh environments, LED Vapor Tight replaces a two- or four-lamp 4' T8 fixture and comes in 3,500- and 7,000-lumen models offering 100 lumens per watt at 5000K with a CRI of 80. Zero-to-10V dimmable, it weighs 5 lbs. and measures 22.5" long by 7" wide by 5.7" tall. • *shatrshield.com*

COMMERCIAL INDOOR (LINEAR FLUORESCENT, TROFFERS, SUSPENDED, SURFACE, LED, OLED)

Element Merge Recessed Linear System, Tech Lighting • Merge lets designers create a continuous line of recessed indirect illumination coupled with an integrated track that supports pendants and spot heads for a high level of customization. Available at a static 2700K, 3000K, and 3500K, a programmable 2700K and 4000K, or RGB, the luminaire can be specified in straight runs as well as 90-degree turns from the ceiling to the wall. The jury appreciated Merge's "clean, contemporary design and versatility." • *element-lighting.com*

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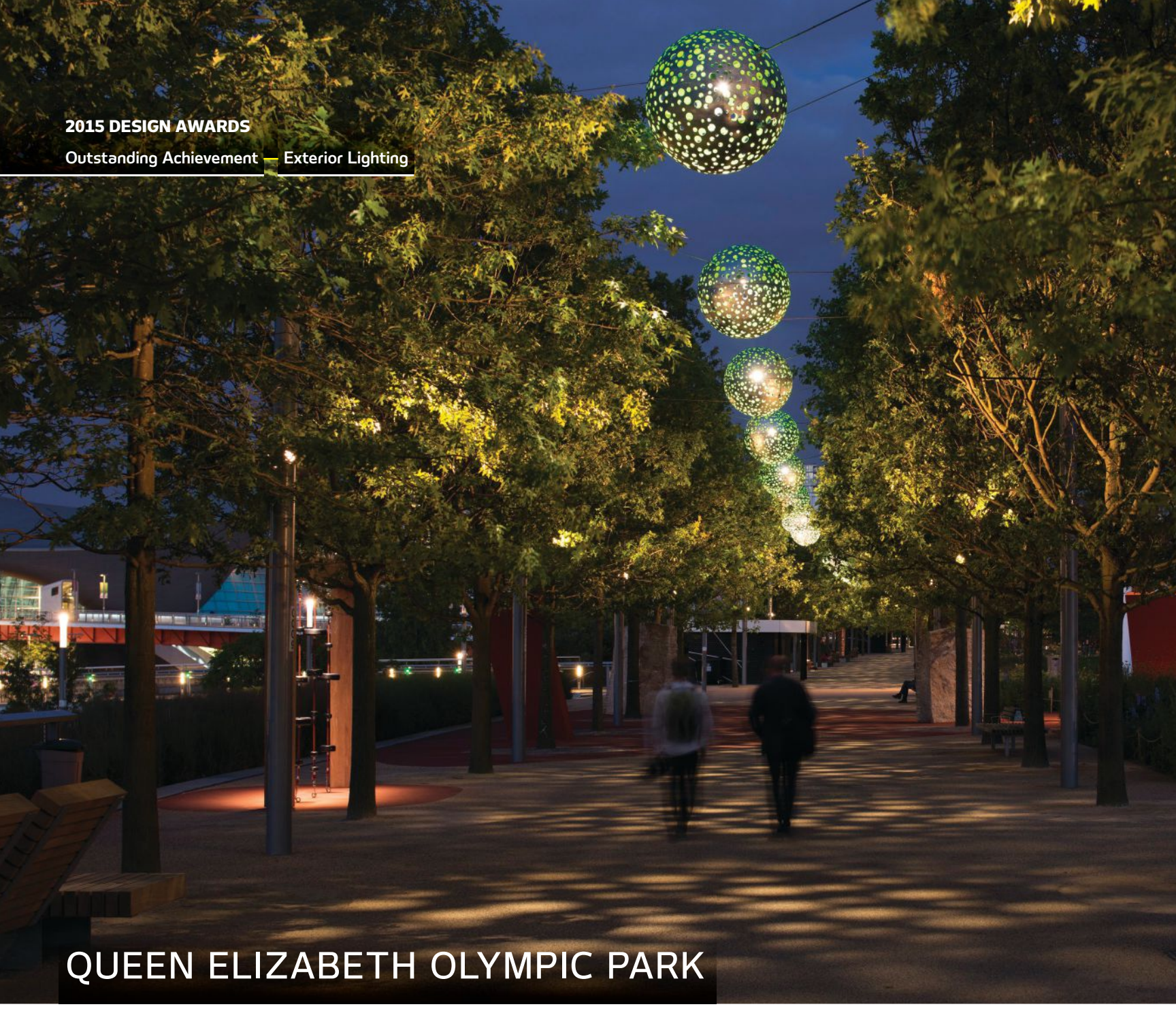
TWELFTH ANNUAL AL LIGHT & ARCHITECTURE DESIGN AWARDS

text by Elizabeth Donoff

The outstanding work being produced by lighting designers today is in full evidence in the 12 winning projects being recognized by the 2015 AL Light & Architecture Design Awards. This year's winners—a public park, a subway line, a synagogue, a school, a theater, an outdoor dining spot, a conference center, a building lobby, a restaurant, an international pavilion, a museum period-room, and a branding/wayfinding scheme—were selected from a pool of more than 100 projects from around the world. The variety in the winners' aesthetic responses and technical solutions is distinct, made all the more impressive since each project is so different in its programmatic mission. Each one provides an artful arrangement of illumination strategies that reflects the knowledge and deft lighting mastery of their lighting designers. Even in the extreme varying degrees of scale of each project, all 12 succeed in creating a unique moment of transition that helps us to navigate through our everyday activities. Once again, lighting proves the invaluable link to our built environment and serves as the tool to best decipher our visual world. •



QUEEN ELIZABETH OLYMPIC PARK

Entrant: SPEIRS + MAJOR

One of the key themes of the 2012 London Summer Olympics was "Legacy." The organizers of the London Olympics were acutely aware that all of the new facilities and infrastructure constructed for the games should serve as the foundation for the redevelopment of the 618-acre site in East London and provide long-lasting benefits to the city and its residents.

To that end, the Queen Elizabeth Olympic Park, which knits together the various Olympic venues has now entered into its "After the Games" life. Helping to oversee the work is lighting firm Speirs + Major, who developed the original lighting master plan for the Olympic Park and Athlete's Village. As part of the competition-winning group appointed to transform the Olympic sites, the goal has been to create a series of engaging parkland, waterways, and outdoor spaces for all Londoners.

The main lighting element of the park is a custom-designed catenary system developed for the Promenade, the main thoroughfare, which runs from Orbit Plaza to the Carpenters Lock. Perforated, "moon-like" spheres are suspended over the walkway and emit a dappled light from a custom-designed LED light module developed to provide the required light distribution and work with the catenary system. The illuminated tree canopy to each side frames this bold and playful lighting element.

The interior of each sphere is painted in shades of green and blue and the spheres themselves are ordered in such a way that the entire chain of fixtures gradually shifts in color over the course of the path. The addition of the interior color helps give the lighting effect a sense of depth and creates a perspective sight line that guides visitors along the walkway. The effect also recalls the feel of light filtering through a canopy of trees in a forest and creates a dynamic environment in which people are animated with light—and with dark.

Other elements within the park have all been revisited and are illuminated to meet general lighting, safety, and security requirements. At night, the lighting of the swing seats along the Promenade, accomplished with 9W 3000K LED downlights in the swing's supporting beam, provide bursts of illumination and provide a contrast to the dark of the night sky.

The new lighting elements build on the strategy originally developed as part of the Olympic lighting master plan. Attention is paid to how light is used to provide parkgoers with different visual cues as they navigate the grounds. Some areas are lit, while others are purposely left dark to create a natural balance in illumination levels. The overall effect is an enchanting urban nighttime environment.

—ELIZABETH DONOFF

Details

Project: Queen Elizabeth Olympic Park, London • **Client:** London Legacy Development Co., London • **Architect:** Make Architecture, London • **Lighting Designer:** Speirs + Major, London • **Team Members:** Mark Major, Philip Rose, Hiroto Toyoda, Ting Ji • **Executive Lighting Designer:** Michael Grubb Studio, Bournemouth, England • **Landscape Architect:** James Corner Field Operations, New York • **Photographer:** James Newton Photographs, London • **Project Size:** 369,477 square feet • **Project and Lighting Costs:** Withheld • **Watts per Square Foot:** 0.03W • **Code Compliance:** Not Applicable • **Manufacturers:** ACDC, iGuzzini, Mike Stoane Lighting, Philips

Jury Comments

• The lighting provides an immersive, playful experience that integrates with the landscape. • There is a heightened theatrical nature through the light that gives the park a magical feeling. • The use of the colors blue and green—to create a sense of depth—is effective. • The lighting design allows you to experience darkness comfortably with sufficient light levels.

DULLES METRO RAIL / SILVER LINE

Entrant: DOMINGO GONZALEZ ASSOCIATES

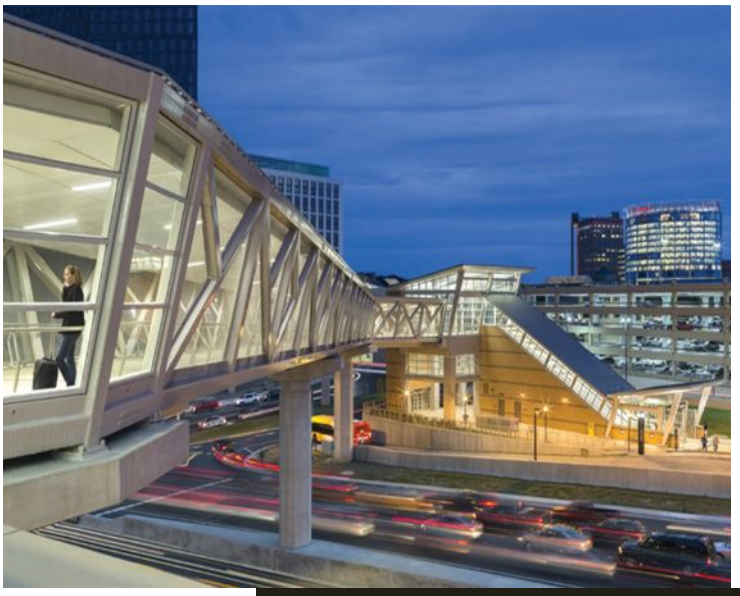
The lengthy bureaucratic process behind connecting downtown Washington, D.C., to Dulles International Airport in Virginia via rail is a few steps closer with the introduction of five new transit stations along the Silver Line, inaugurated in 2014. The Washington Metropolitan Area Transit Authority (WMATA) and architects Dulles Transit Partners began designs for the Silver Line in 2003. In the years since, New York–based lighting design firm Domingo Gonzalez Associates (DGA) had to contend with changes in local, regional, and national leadership as well as a recession that left behind a general reticence to spend money on infrastructure.

The resulting stations succeed despite heavy value engineering, and they offer an angular, contemporary take on the original Harry Weese–designed WMATA stations, with subtle references integrated into modern, striking forms that mark transit nodes along the Dulles toll road. Although mandates for general lighting and egress were stringent, an equally strict allowable palette of luminaire types meant that DGA could easily adapt the lighting design to fit the evolving needs of the architecture over the course of the project's development.

Linear lighting strategies reinforce wayfinding to and within the stations, with bare lamp 3500K T8 strips providing walking surface illumination as well as uplighting for the roof structure. Photocells control nighttime operation of exterior and passage lighting, and custom reflector luminaires with T8 lamps ensure safe light levels at the station platforms. In the stations that include skylights in their canopies, white compact fluorescent uplights contribute additional reflected luminance.

The design team focused its efforts on employing low-maintenance and durable design solutions wherever possible in an effort to prevent station service outages. Integrated 3500K T5 stairway handrail fixtures and custom 3500K T8 escalator balustrade lighting are part of that approach, and also contribute to meeting overall energy use targets while enhancing circulation legibility within the stations.

Despite the budgetary, logistical, and bureaucratic challenges of a multi-year, multi-stakeholder, multi-venue set of projects, DGA achieved a consistent lighting language across the five Virginia Silver Line stations. The use of linear fixtures underscores the angular forms and reinforces the architectural intent while delivering maximum light output and low expected upkeep. The new stations have already become glistening gems within an aging rail system, and hold promise for more sustainable transit infrastructure solutions in the region. —DEANE MADSEN



Details

Project: Dulles Metro Rail/Silver Line, Northern Virginia • **Client:** Washington Metropolitan Area Transit Authority, Washington, D.C. • **Architect:** Dulles Transit Partners, Vienna, Va. • **Lighting Designer:** Domingo Gonzalez Associates, New York • **Team Members:** Domingo Gonzalez, AC Hickox, Patrick Merosier, Fredrick Amnas, Ana Pena • **Photographer:** Joseph Romeo Photography • **Project Size:** 23.5 miles • **Project Cost:** $2.1 billion • **Lighting Cost:** $1.975 million • **Watts per Square Foot:** 0.82 • **Code Compliance:** ASHRAE 90.1-2007 Transportation • **Manufacturers:** Apogee Translite, GE Lighting, Hubbell Lighting/Kim Lighting, Philips Lumec

Jury Comments

• Great combination of lighting the architecture while balancing the functional requirements. • The lighting creates an inviting and calming sense even though the project is all about movement.

LINCOLN SQUARE SYNAGOGUE

Entrant: TILLOTSON DESIGN ASSOCIATES

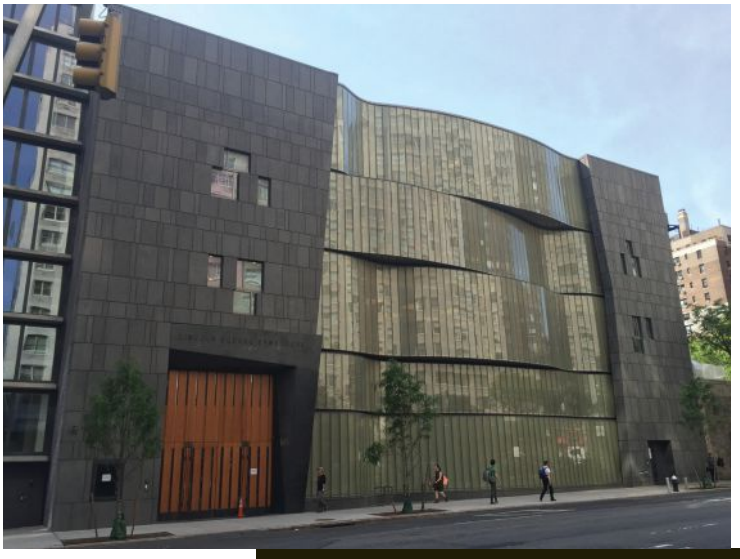
The Torah, the core text of Judaism, serves as the literal and figurative inspiration for the design of the Lincoln Square Synagogue's new home on Manhattan's Upper West Side. Its façade features solid, masonry walls at each end that give way to an undulating opaque glass curtainwall in the center that recalls the form of an open Torah with its sacred parchment text wound on two wooden dowels.

The double-laminated and insulated glass has a bronze-colored, pleated, sheer woven Trevira fabric encapsulated between its panels. Linear LEDs are positioned at the top and bottom of each panel and provide a diffuse line of light without revealing the fixture hardware. A white ceramic silk-screen dot pattern is then applied to the interior lite of the curtainwall, creating an additional layer of privacy for worshipers. The entire assembly begins the architectural and lighting dialogue and creates a luminous backdrop for the main sanctuary within.

The sanctuary space itself is a circular room with in-the-round-style seating. The Torah Ark is set in front of the curtainwall and the Bimah—the podium from which the Torah is read—is in the center of the room. The rest of the sanctuary's perimeter wall is lined with faceted acoustical panels broken by a soffit cove that conceals LED fixtures. These luminaires cast a soft spill of light onto the wall below continuing the wash of illumination around the entire room. Here, too, there is symbolic meaning; the shape of the space is meant to symbolize a tent, recalling the nomadic structures of the ancient Hebrews. The symbolism continues in the ceiling, dotted with 613 1¾"-diameter LED downlights, an abstract representation of a starry night sky in the desert, and a reference to the 613 mitzvot (commandments) outlined in the Torah. The geometry of the space—articulated walls and convex ceiling—creates a natural sound amplification, eliminating the need for speaker equipment during services.

Architectural motifs are carried through to the lobby as well. The lower band of the undulating glass ribbon wall from the building's façade extends inside and becomes the north wall of the main lobby and sculptural stair at the entrance. The same linear LED fixture used for the curtainwall is installed here as well. The planar surface of the wood finish is highlighted by an LED covelight and the overall ceiling height is further emphasized by a T5 fluorescent uplight slot in the stone wall opposite.

In building a new place of worship for this congregation, the design team has created a contemplative space that respects the Judaic traditions in a completely contemporary setting that allows congregants to connect the present with the past. —E.D.

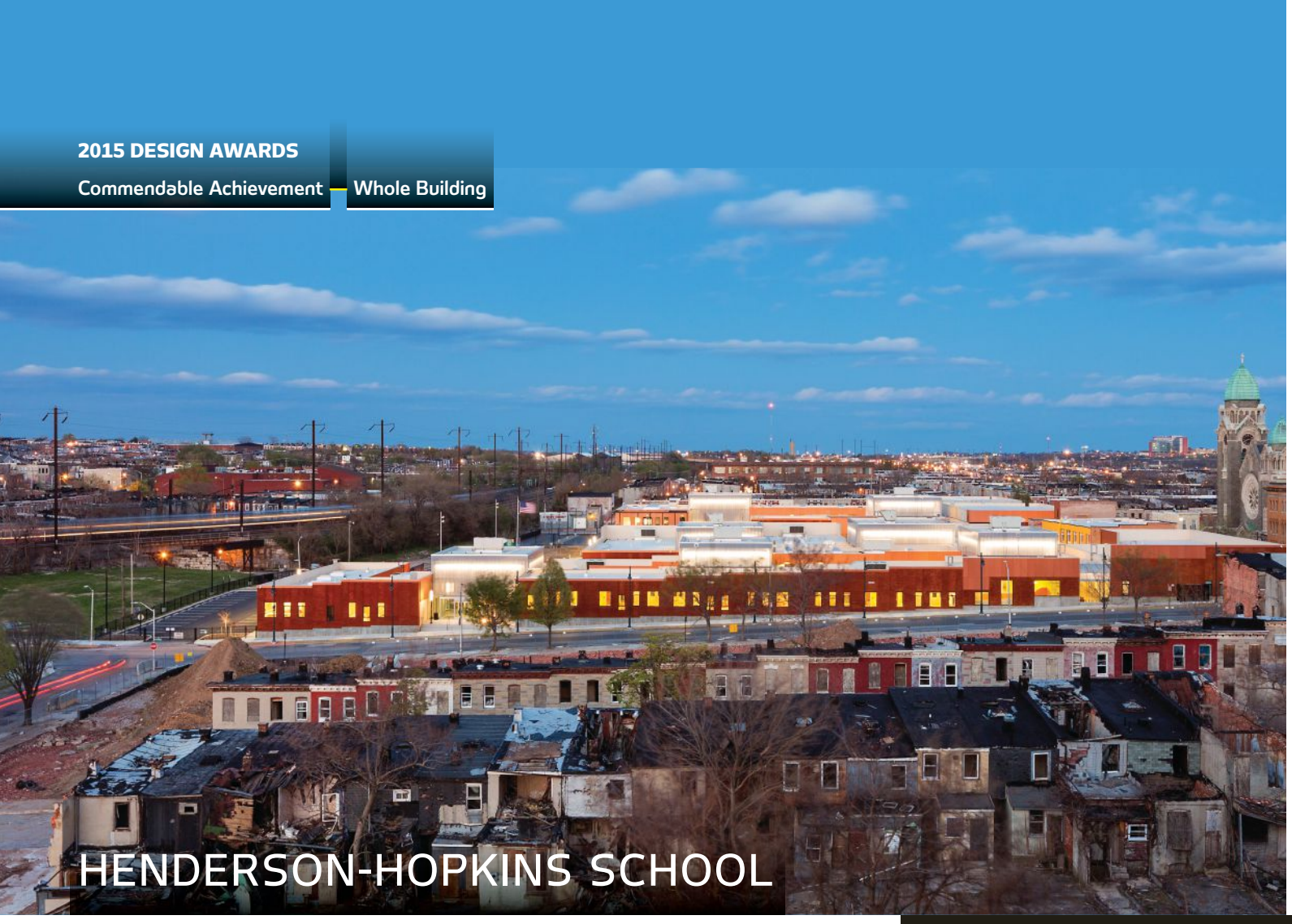


Details

Project: Lincoln Square Synagogue, New York • **Client:** Lincoln Square Synagogue • **Architect:** CetraRuddy, New York • **Lighting Designer:** Tillotson Design Associates, New York • **Team Members:** Suzan Tillotson, Ellen Sears, David Burya • **Photographers:** Emile Dubuisson, Studio Dubuisson; David Sundberg/Esto • **Project Size:** 52,000 square feet • **Project Cost:** Withheld • **Lighting Cost:** $900,000 • **Watts per Square Foot:** 1.3 • **Code Compliance:** ASHRAE 90.1-2007 • **Manufacturers:** Eaton's io LED, Philips Lightolier, Starfire

Jury Comments

• A holistic design that references a story through light. • Different elements are combined to make a unified whole. • The lighting creates a tasteful, well-balanced, uplifting space. • The project will age well.



HENDERSON-HOPKINS SCHOOL

Entrant: FLUX STUDIO

Good design matters, especially when its efforts are focused on traditionally neglected communities. Such is the case with Middle East Baltimore, one of Baltimore's most crime-ridden and poverty-stricken districts. But all that is hopefully starting to change thanks to the Henderson-Hopkins School, the first new public school to be built in the city in 30 years.

The school breathes new life into the community, both literally and figuratively, with an early childcare center, a school, and shared community and recreational spaces. The shape of the building embraces progressive education models with different modules creating flexible learning spaces that can adapt to children's needs as they grow up. The lighting solutions follow suit with a contemporary design response to match the architecture, while still providing the necessary robustness required to address vandalism and public safety concerns.

Collington Commons, an extension of the existing street, is the school's main exterior public space. Fourteen-foot-tall pole lights line the area and are outfitted with low-brightness T5 refractors. Additionally, full-cutoff LED area luminaires are wall-mounted in perimeter open spaces to provide the required light levels without overpowering the illumination from those pole luminaires. At the building entry, vertical surfaces and the textured masonry walls are lit with linear LED wall grazers. A translucent polycarbonate light box above the adjacent architectural volume is backlit with T5 lamps.

Inside, electric lighting solutions are coupled with daylight harvesting to create a bright, open environment and to maximize energy efficiency. Specified in 2010, T5 and T5HO lamps were selected for the majority of the interior spaces in order to meet energy requirements and to establish an easy-to-maintain luminaire equipment list. Cable-mounted T5 luminaires with high-performance micro-prismatic lenses are used in the classrooms.

Lighting, inside and out, creates a welcoming, nurturing, and safe environment for students, teachers, and the community. —E.D.

Details

Project: Henderson-Hopkins School, Baltimore • **Client:** East Baltimore Community School Inc., Baltimore • **Architect:** Rogers Partners Architects + Urban Designers, New York • **Lighting Designer:** Flux Studio, Baltimore • **Team Members:** Glenn Shrum, Ryan Jackson, Rebecca Bost Becheanu, Kyle McGahan • **Photographer:** Albert Vecerka/Esto • **Project Size:** 125,000 square feet • **Project Cost:** $42 million • **Lighting Cost (hardware only):** $450,000 (interior); $161,000 (exterior including athletic field) • **Watts per Square Foot:** 0.51 (interior); 0.14 (exterior) • **Code Compliance:** ASHRAE 90.1-2007, Baltimore Green Building Standards (LEED for Schools equivalent) • **Manufacturers:** Acuity Brands/Holophane, Bartco Lighting, Cree, Eaton (Corelite, Halo, io LED, Lumark, McGraw-Edison, Metalux), Osram Sylvania, Selux, Zumtobel

Jury Comments

• The lighting understood the technical, social, and economic issues. • It creates a beacon in the cityscape.

LOBERO THEATRE

Entrant: ANN KALE ASSOCIATES

The Lobero Theatre, located in the historic Pueblo Viejo district of Santa Barbara, Calif., is the state's oldest continuously operating theater and was designed by noted architect George Washington Smith, who is credited with bringing the Spanish Colonial Revival style to California. Operated by the Lobero Theatre Foundation, the facility relies on annual donations. Over the course of time, the theater has become in sore need of a rehabilitation.

A re-envisioned lighting strategy by Anne Kale Associates has helped to transform the building. After the rehab, the Lobero has re-emerged as the architectural jewel that it is. The exterior façade, previously only illuminated by wall sconces and residual light trespass from parking lot fixtures across the street, is now artfully illuminated by custom light poles and pendants that were designed to match the building's original wall sconces (which were restored) and new 2700K in-ground uplights. The new uplights are located in front of each of the entry portico's columns, but positioned under the eave to meet the city's Dark-Sky Ordinance. These uplights are only lit on performance nights.

The foundation did not feel it appropriate to add new fixtures to the interior of the landmarked building, so Kale had to find a way to incorporate new equipment into the existing house lighting elements: a single chandelier and 10 wall sconces. Long-life, miniature xenon uplights, selected during a mock-up for their superior color and continuous dimming, were installed on top of the existing chandelier and highlight the painted coffered ceiling. The chandelier itself was relamped with 40 A15 frosted lamps. The wall sconces were modified to remove the center arm to make way for an MR16 up-downlight, which is concealed behind a new decorative shield. These sconces illuminate the columns and the perimeter ceiling.

A tight budget, and an extensive review process did not deter the design team in creating a creative lighting solution, the result of which is a stunning second act for the historic Lobero Theatre. —E.D.

Details

Project: Lobero Theatre, Santa Barbara, Calif. • **Client:** Lobero Theatre Foundation, Santa Barbara • **Architect:** KBZ Architects, Santa Barbara • **Lighting Designer:** Ann Kale Associates, Santa Barbara • **Team Members:** Ann Kale, Jacquelyn Cacan • **Photographer:** Ciro Coelho, Santa Barbara • **Project Size:** 7,700 square feet (interior) plus ¾ acre (exterior) • **Project Cost:** $3.8 million • **Lighting Cost:** Withheld • **Watts per Square Foot:** 1.5 • **Code Compliance:** Title 24-2010 • **Manufacturers:** Acuity Brands/Winona Lighting, Auroralight, Bega, B-K Lighting and Teka Illumination, Ironcad Ltd., Tokistar

Jury Comments

• The "before" and "after" is striking. • The new lighting respects the architecture. • The design pays careful attention to detail and the user experience.

TAVERN ON THE GREEN

Entrant: FOCUS LIGHTING

Tavern on the Green has been one of New York City's most famous destination restaurants for the past 80 years. Located in Central Park at West 67th Street, it reopened in 2014 after a top-to-bottom, multi-year renovation that restored the restaurant back to its glory days as the "Jewel of Central Park."

An important goal of the courtyard redesign was how to re-create the look and feel of the iconic Crystal Room that overlooked the park, which was home to a group of London Plane trees that were wrapped in twinkling Christmas lights. Challenges abounded. First, the terrace trees no longer existed—they had been at the end of their life and removed during the first phases of the renovation. Second, the Central Park Conservancy had set new conditions that none of the newly planted trees could be pierced in any way by lighting elements that would prematurely age them.

After extensive studies and mock-ups, the design team at Focus Lighting developed a series of miniature chandeliers—500 in total—that have been strung to mimic the silhouette of the roof of a circus tent, and create a canopy of light against the sky every bit as effective and evocative as the illuminated trees that once were there. Each shade has a 3.5W 2400K LED lamp that provides an 86 percent reduction in energy use and a 10 percent increase in lumen output compared to a regular 25W incandescent lamp that would have been used pre-LEDs.

To provide additional lighting, pole-mounted custom glass lanterns with a frit were designed to provide an additional soft ambient light for the space. At the top of the poles, floodlights outfitted with blue LED accent luminaires and 4200K pattern projectors create a dappled moonlight effect on the slate roof of the existing building, which was designed in 1870 by architect Calvert Vaux in the Gothic Revival architectural style and was home to the sheep who grazed in the park's nearby meadow.

Layers of light are carefully sculpted for this new outdoor space as it pays homage to the iconic setting by way of a contemporary lighting solution. —E.D.

Details

Project: Tavern on the Green, New York • **Client:** Emerald Green Group • **Architects:** Richard H. Lewis Architect, New York; Swanke Hayden Connell Architects, New York • **Landscape Architect:** Robin Key Landscape Architecture, New York • **Lighting Designer:** Focus Lighting and KB Associates, New York • **Team Members:** Paul Gregory, Ken Billington, Christine Hope, Brett Andersen, Hilary Manners, Valentina Doro, Dan Nichols, Andrew Balmer • **Photographer:** Ryan Fischer/Focus Lighting • **Project Size:** 10,000 square feet • **Project and Lighting Costs:** Withheld • **Watts per Square Foot:** 1W (exterior) • **Code Compliance:** Not Applicable • **Manufacturers (exterior only):** Archipelago Lighting, B-K Lighting, Canopy Designs, Dabmar Lighting, HK USA Lighting Group, Lumid, Philips, Eaton/Lumiere, Luminii, Primus Lighting, Visual Lighting Technologies, Vision Quest Lighting

Jury Comments

• The lighting creates a new iconic imagery and creates a sense of place for this outdoor room.

NANJING INTERNATIONAL YOUTH CULTURAL CENTER

Entrant: GRAND SIGHT DESIGN INTERNATIONAL

Built for the 2014 Youth Olympic Games held in Nanjing, China, from Aug. 16 to 28, the Nanjing International Youth Cultural Center is statement architecture for a city experiencing significant growth. The six-story center, designed by London-based Zaha Hadid Architects, combines multipurpose conference rooms with a 505-seat concert hall, a 2,181-seat convention hall, banquet facilities, and support areas. These functions are contained within a series of curvaceous forms representative of a signature style employed by the design firm that is engaging architecturally, but challenging in terms of uniformity of light distribution.

Lighting design firm Grand Sight Design International (GSDI) opted to eschew the use of barrel fixtures in favor of parametrically designed light panels, backlit by custom LED fixtures, to harness the dynamism of the architecture. Noting the variable ceiling heights of the interiors, the lighting team likewise varied the aperture size of dimmable, diamond-shaped light panels in the circulation zones to modulate the amount of light to correspond with the volume of the space and to achieve uniform illumination throughout the center. In the concert hall, the round apertures of variable-diameter downlights create a feeling of pointillism on the layered ceiling. Fixture installation is from an outer ceiling layer to ensure uninterrupted ceiling surfaces at their mounting faces. Within each space, same-sized panels are grouped together in control loops on separate dimmers, such that the ceilings can be divided into different zones, which allows for graduated levels of illumination for pre-set scenes.

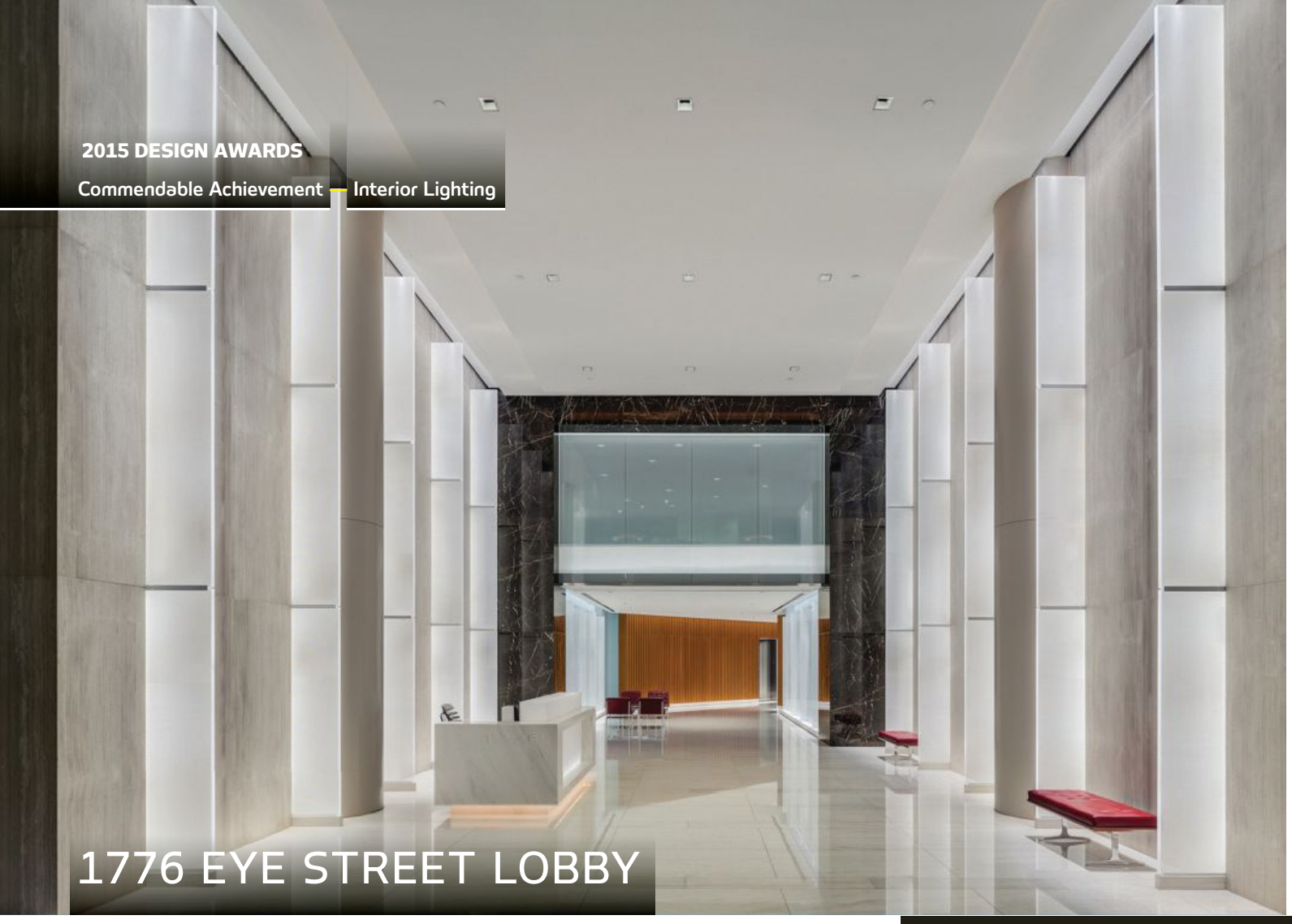
In the conference center's main spaces, GSDI adapted the LED-backlit panels to fit hyper-localized ceiling-to-surface conditions, and in the concert hall, GSDI varied aperture sizes of round downlights. Both approaches allow the lighting to mimic the parametric flow of the spaces with energetic luminaire patterning that complements and emphasizes the architecture into which it is embedded. —D.M.

Details

Project: Nanjing International Youth Cultural Center, Nanjing, China • **Client:** Nanjing Hexi New Town Construction Headquarters • **Architect:** Zaha Hadid Architects, London • **Lighting Designer:** Grand Sight Design International, Hong Kong • **Team Members:** YanZhi Wang, XinYu Huang, Ron Chow, George Ren • **Photographer:** Shu He Architectural Photography Studio • **Project Size:** 2.088 million square feet • **Project Cost:** 4 billion RMB ($644.1 million) • **Lighting Cost:** 15 million RMB ($2.4 million) • **Watts per Square Foot:** 1.34 • **Code Compliance:** GB-50034-2013 • **Manufacturers:** CDN Lighting, Dongguan GuoNeng Energy Saving Technology Co., Shenzhen Tops Lighting Technology Co.

Jury Comments

• It's impressive that they could execute that level of detail on such a grand scale. • The lighting supports the dynamic nature of the architecture's fluid forms.



1776 EYE STREET LOBBY

Entrant: MCLA

In the bustling commercial district adjacent to the White House, Washington, D.C., area lobbying firms look to make street-visible statements with their namesake entryways. At 1776 Eye Street NW, a refurbishment of a 1980s corporate interior is transformed into a bright, contemporary lobby and elevator bay. The new space greets its corner intersection with a double-height glass-enclosed volume that welcomes visitors into an ethereal setting.

Local lighting design firm MCLA collaborated with local architecture firm Leo A Daly to produce a lighting strategy that would achieve high light-output levels with minimal shadows. The architecture produces rhythmic variation through an emphasis on verticality that increases in tempo the farther one moves into the space. The entry's glass-walled volume transitions to a stone portal flanked by vertical, edge-lighted glass fins. Beyond the guard desk, backlit glass panels divided by more glass fins that line the entry corridor and continue the visual progression to the elevator bay. Tightly spaced, vertical wood slats, lit with warm-white LED grazing fixtures, form the walls of the elevator bay and mark shifts in both mood and materiality.

An architectural impulse to minimize the visibility of light sources led the lighting designers to coordinate with a fixture manufacturer to develop perforated panel details that would prevent recessed luminaires from overheating. Grazing fixtures concealed in the walls—extruded 3000K linear LED floodlights with medium-flood optics—light the vertical fins of the entryway while minimizing fixture reflections; in the corridor, narrow-distribution luminaires light the smaller glass fins. 2400K LED cove lamps and programmable color-changing RGB fixtures in the lobby and at the guard desk can be controlled to scene presets to mark special occasions and holidays. Subtle 3000K LED pinhole spackle flange downlights provide additional illumination without disrupting the continuity of the ceiling plane, so that visitors encounter cool serenity upon entering the space. —D.M.

Details

Project: 1776 Eye Street Lobby, Washington, D.C. • **Client:** DTZ, Washington, D.C. • **Architect:** Leo A Daly, Washington, D.C. • **Lighting Designer:** MCLA, Washington, D.C. • **Team Members:** Frank Feist, Maureen Moran • **Photographer:** Prakash Patel • **Project Size:** 2,600 square feet • **Project Cost:** Withheld • **Lighting Cost:** $400,000 • **Watts per Square Foot:** 3.36 • **Code Compliance:** ASHRAE 90.1 • **Manufacturers:** Acclaim, Element, Filix, Insight, Kurt Versen, Prolume, Tokistar

Jury Comments

• The complexity of the lighting design is striking in the perceived simplicity of its execution. • Light plays off the rich material palette very nicely. • The lighting is well integrated into the interior architecture.

CHEFS CLUB

Entrant: FOCUS LIGHTING

Chefs Club by Food & Wine is located in the historic Puck Building in New York City, just two blocks from Broadway where the neighborhoods of SoHo and Nolita meet. The concept behind the restaurant is to showcase *Food & Wine*'s Best New Chef award winners. Diners can book a seat overlooking the open kitchen to sample special testing menus prepared by these up-and-coming culinary stars and other master chefs.

The restaurant's interiors were designed by the Rockwell Group, who, along with lighting firm Focus Lighting, sought to create a relaxed atmosphere that celebrates both the historic architectural elements of the 130-year-old building and the experimental culinary activities of the visiting chefs.

The strategy behind the lighting and selection of warm color temperatures is meant to create a cozy feel while highlighting the texture of the wood and brick finishes. A hint of what the interiors will reveal starts at the entry where the sidewalk's light vault steps, a signature feature of Lower Manhattan architecture from the mid-1800s, is illuminated with white 2700K LEDs. Once inside, the brick walls of the bar area are illuminated with grazing LED light strips, recessed behind ductwork to conceal from view. Six, custom-designed, large, decorative ball-shaped pendants hang above the wooden bar, while the bar's edge is illuminated with a low-voltage LED strip. Glassware and bottles on the shelving behind the bar are highlighted by LED strips integrated into the shelves' tubular structure.

In the dining room, the challenge was to create a balance between the high lighting levels required for the open kitchen with that of the more intimate seating areas. 35W MR16 fixtures with a tracklighting system supported from the metal ribs of the ceiling's barrel vaults get the job done.

Light articulates the materials palette and the architectural details of Chefs Club while creating a seamless experience from kitchen to table. —E.D.

Details

Project: Chefs Club, New York • **Client:** OptAsia Capital Co., Thailand • **Architect:** Rockwell Group, New York • **Lighting Designer:** Focus Lighting, New York • **Team Members:** Brett Andersen, Kelly Hannon, Rebecca Becheanu, Zackry Wiegand • **Photographer:** Ryan Fischer/Focus Lighting • **Project Size:** 7,450 square feet • **Project Costs:** Withheld • **Lighting Costs:** $160,000 (equipment) • **Watts per Square Foot and Code Compliance:** Not applicable since project is in a landmarked building, which is grandfathered under old codes. • **Manufacturers:** Concealite, Contrast Lighting, Edge Lighting, Juno Lighting Group by Schneider Electric, Lamar Lighting, Lutron, Philips Lightolier, SSL, Tokistar

Jury Comments

• Tastefully done. • No missteps. • The lighting underlines the experience of the space. • The lighting creates the right amount of drama expected for a restaurant setting.

U.K. PAVILION, MILAN EXPO 2015

Entrant: BDP

The U.K. Pavilion at the 2015 Milan Expo created a lot of buzz with its artist-designed installation, called "The Hive," by Wolfgang Buttress. Distilling the expo's theme, "Feeding the Planet, Energy for Life," Buttress chose to focus on the importance of the honey bee to global food production. His resulting structure took the lion's share of the budget, providing a challenge for BDP, who took on the tripartite role of architect, landscape architect, and lighting designer for the U.K.'s pavilion.

The Hive is a 46-foot cube out of which a spherical void was carved to make it habitable. A complex armature of steel rods and connectors, like an oversized Erector Set, forms the volume of the structure, with audiovisual components embedded into the individual pieces. A live stream of data collected by accelerometers placed within a real beehive translates to sound and light displays. An algorithm converts vibrations of individual bees into pulsating lights via 1,000 individually controlled LEDs that make the Hive come alive with the movements of the bee population.

Tasked with providing the look of a high-budget lighting design using limited finances, BDP strove to integrate luminaires into the architecture wherever possible, and worked closely with British manufacturers to achieve maximum effect with minimal expense. Outside, BDP installed a linear garden and orchard that form the approach to the pavilion. Integrated handrail and skirt-mounted fixtures delineate pathways through the landscape to a bright feature wall full of information about bees—dubbed the Swarm, in keeping with the apicultural theme. On the pavilion's terrace, recessed fixtures beneath the floor add an overscaled honeycomb effect through backlighting. Clusters of custom hexagonal aluminum extrusions hang from the interior conference room's ceiling to provide a soft amber glow.

Using a minimally expressed lighting sensibility, BDP achieved ample illumination while still deferring to the artistic expression of the Hive and its buzzing activity. —D.M.

Details

Project: U.K. Pavilion, Milan Expo 2015, Milan • **Client:** Stage One, North Yorkshire, England • **Architect and Landscape Architect:** BDP, Manchester, England • **Artist for the Hive:** Wolfgang Buttress, Nottingham, England • **Lighting Designer:** BDP, Manchester • **Team Members:** Rhiannon West, Colin Ball, Chris Lowe • **Photographers:** Nick Caville, David Barbour • **Project Size:** 1900 square meters (20,451 square feet) • **Project Cost:** £6 million ($9.378 million) • **Lighting Cost:** £25,000 (landscape and architecture); £200,000 (Hive) ($351,733 total) • **Watts per Square Foot:** 13.2 • **Code Compliance:** SLL Code for Lighting and LG8 Museums and Art Galleries (ambient lighting), BS 5266-1 and BS EN 1838 (emergency lighting) • **Manufacturers:** Light Projects Group, LEDFlex, Lumenpulse, Luxonic Lighting, Mike Stoane Lighting, Thorlux Lighting

Jury Comments

• Technically sophisticated. • The lighting is the transformative element; it's conceptual but it still provides good, usable illumination.

Commendable Achievement — Exhibition Lighting and Temporary Installations

CALIFORNIA PALACE OF THE LEGION OF HONOR, SALON DORÉ

Entrant: AUERBACH GLASOW FRENCH

The Salon Doré from the Hôtel de La Trémoille in Paris is one of the finest examples of French Neoclassical interior architecture currently on view in the United States. The richly carved and ornately guilded wall panels were designed during the reign of Louis XVI, and the room was first dismantled at its original rue Saint-Dominique location in 1877, eventually getting donated to the California Palace of the Legion of Honor in San Francisco in 1959. In recent years, however, the curators felt that the lighting was missing the mark, and so the decision was made to restore the room to its original 18th century appearance.

This meant that no modern lighting equipment could be visible, which presented a challenge for the lighting design team at Auerbach Glasow French. Furthermore, the designers also had to create an atmosphere that was representative of the time, which meant re-creating a quality of illumination that would emulate the look of candlelight and the room's set scene: the gray twilight of the Paris sky. An additional layer of complexity was the fact that the historic fixtures were too fragile to move and had to be rewired and retrofitted on site.

Throughout the project, the lighting designers cleverly figured out ways to conceal new lighting elements within the existing luminaires. For example, 7W faux wax candles are used in the historic fixtures to mimic the glow of candlelight, and 1W 14V automotive "glow lights" further enhance the feel. To achieve "Paris twilight," fiber optic spotlights hidden in the chandelier are combined with LED grazing uplights in the narrow window cavities and 20W adjustable MR16 spotlights hidden in the wall sconce stanchions. To meet present-day requirements, emergency and work lights are concealed in a linear cove tucked into the historic cornice.

This intricate coordination of technical details has resulted in a restoration that not only captures the architectural spirit of this 18th century interior but the quality of illumination so distinct to the pre-electric lighting world. —E.D.

Details

Project: California Palace of the Legion of Honor, Salon Doré, San Francisco • **Client:** Fine Arts Museums of San Francisco, San Francisco • **Architect:** Andrew Skurman Architects, San Francisco • **Lighting Designer:** Auerbach Glasow French, San Francisco • **Team Members:** Patricia Glasow, Marlene Lieu • **Photographer:** John F. Martin Photography (except for "before" image) • **Project Size:** 673 square feet • **Project Renovation Cost:** $2 million • **Lighting Cost:** **$317,000** • **Watts per Square Foot:** 1.3 (per square foot for exhibition); 0.96 per square foot for work light—not used together • **Code Compliance:** California Title 24 • **Manufacturers:** Acuity Brands/Winona Lighting, Lighting Services Inc, Lucifer Lighting, Luxam Phoenix Day, SPI

Jury Comments

• The lighting design is impressive given the limitations placed upon the design. • The technical sophistication is mind-blowing. • One has to really know lighting design in order to create this scheme.

MICROSOFT TECHNOLOGY CENTER

Entrant: SMITHGROUPJJR

Microsoft's Technology Center serves as a showroom for the company's products as well as offices for Microsoft staff and client engineers to meet and develop custom solutions. In approaching the renovation of this existing facility, the architecture and lighting design teams at SmithGroupJJR sought to create an environment that would match the company's corporate brand identity, create a clearer system of wayfinding, and celebrate the tech giant's logo. To achieve this, the team used color as the design vehicle to connect the interiors to the main façade and building entry sequence.

To start, the mullion and glass structure of the main entry wall mimics the company's logo of four squares. The glass in each glazing panel is edge lit with color-changing, multichip, RGB, DMX-dimmable linear LEDs. An abstracted architectural sign, it signals to visitors and employees that one has arrived and hints at what is to come. The color system continues inside as it draws people into the double-height lobby and to the reception desk, which is offset by a backlit translucent feature wall, also lit with RGB, DMX-dimmable linear LEDs. Both the exterior wall and the reception desk wall are controlled and coordinated to display the four colors—red, green, blue, and yellow—of the company's corporate logo.

This color strategy continues through to the main stairway, which wraps around a glass-enclosed multistory server display room. A perimeter cove in the server room conceals blue LEDs that illuminate the glass surfaces, which have a gradient frit applied to the top of the glass enclosure. This helps achieve a 10:1 brightness contrast ratio between the server room and the surrounding ceiling while also eliminating glare. The deep blue hue of the sever room is offset by the adjacent circulation spaces and open-office areas which employ 4000K white-light cylinder-shaped pendants and recessed downlights, respectively.

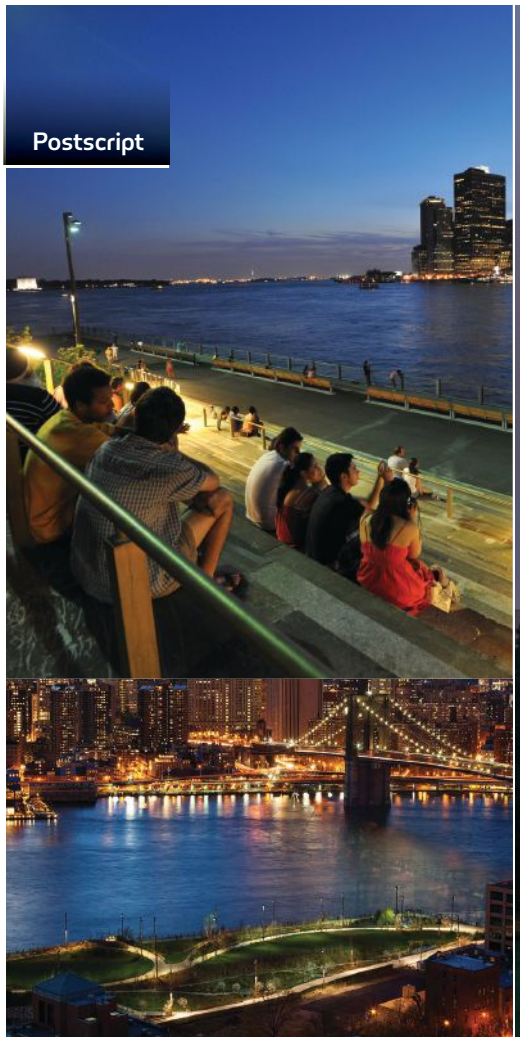
Color is used both as an illumination device and as a communication device, and is integral to shaping this corporate workplace. —E.D.

Details

Project: Microsoft Technology Center, Mountain View, Calif. • **Client:** Microsoft Corp., Mountain View, Calif. • **Architect and Lighting Designer:** SmithGroupJJR, Detroit • **Team Members (lighting):** Matt Alleman, Leland Curtis, Christie Shreve • **Photographers:** David Wakely Photography, Michael David Rose Photography • **Project Size:** 18,320 square feet • **Project Cost:** $4.5 million • **Lighting Cost:** $250,000 • **Watts per Square Foot:** 0.92 • **Code Compliance:** 16,290W, 20 percent under Title 24—Area Category Method • **Manufacturers:** Artemide, Bartco Lighting, Bega, Erco, Lumenpulse, Philips Color Kinetics, Philips Lightolier, The Lighting Quotient, USAI

Jury Comments

• Lighting supports the corporate identity. • Elegant balance for a corporate solution. • Not overdone. • The lighting ties into the wayfinding and provides a clear form of visual communication.



BROOKLYN BRIDGE PARK AND 731 LEXINGTON AVENUE

The 2008 recession has left its fingerprints on many of the projects entered in this year's Design Awards.

One of the more interesting themes that emerged in reviewing this year's entries for the AL Light & Architecture Design Awards was the number of projects that were impacted by the 2008 recession and how the downturn interrupted design, development, and construction. For those projects that were lucky enough to restart when the economy turned, they did so during lighting's transformation from non-LED to LED light sources.

Two projects that best illustrate this are the Brooklyn Bridge Park and the tower-top lighting for 731 Lexington Avenue in New York. In the case of the park, lighting design firm Domingo Gonzalez Associates first started design work in 2004. At the time, linear fluorescent and ceramic metal halide lamps were the best options for the 85 acres of industrial waterfront along the East River being transformed into a public green space. As design continues today, through the project's later phases, the lighting is incorporating LED fixtures.

Another example of how lighting's technological transformation has impacted design can be seen in the tower-top illumination for 731 Lexington Avenue. In this instance, the client went back to the lighting designers who had done the original work in the early 2000s, Cline Bettridge Bernstein Lighting Design (CBBLD), and asked them to update the cold-cathode lighting system with color-changing LEDs. Here, there were a couple of significant challenges: how to use the existing tower-top infrastructure to incorporate new equipment and how to maintain the look and feel of the original cross fade of white light as the 55-story tower comes to life at dusk. CBBLD re-created this effect while adding color-changing and dynamic motion functionality so that the building owner can now illuminate the tower to coordinate with different holiday seasons.

It is unlikely that we will see another generation of projects so doubly impacted by economic and technology forces. —E.D.

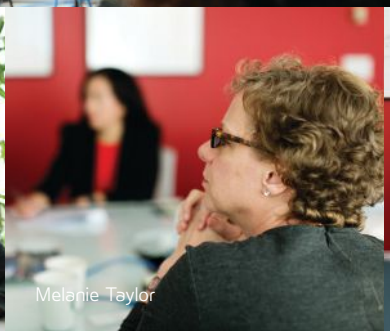
Left: Alex Goldmark; Right: Frieder Blickle/LAIF

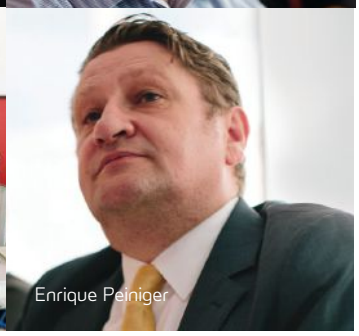
2015 DESIGN AWARDS

Jury Members


Alina Ainza


Michael A. Barber


Melanie Taylor


Enrique Peiniger

Alina Ainza, Founder and Partner, Loop Lighting, New York LEED AP, IES
Ainza is a founding partner of Loop Lighting, an architectural lighting firm whose multidisciplinary approach aims to thoughtfully craft lighting solutions using today's technology. Ainza studied Fine Arts at Maryland Institute College of Art and Interior Design at the University of Florida. During her 15-year career in New York she has been a senior designer at SBLD Studio where she worked on such notable projects as Tishman Speyer's headquarters in Rockefeller Center and General Dynamics' headquarters in Falls Church, Va. Ainza's work has been recognized by the Illuminating Engineering Society with three Lumen Awards.

Michael A. Barber, Principal, The Lighting Practice, Philadelphia
LEED AP BD+C, ASSOCIATE IALD
Barber joined the Lighting Practice in 1995 and became a principal in 2004. He designs lighting for healthcare, academic, corporate, and retail environments, and acts as the firm's sustainable design coordinator, working with designers to maximize their vision while being mindful of environmental considerations. He has served on the International Association of Lighting Designer's Energy and Sustainability Committee. He is also an assistant adjunct professor in the architecture department at Drexel University and has lectured in the sustainable design program at Philadelphia University.

Enrique Peiniger, Principal, Office for Visual Interaction, New York
DIPL.-ING., ASSOC. AIA, IALD, MIES
Trained in architectural engineering and social sciences, Peiniger sees his work in lighting as a technical extension of architecture. He has worked on such notable projects as New York City's LED Streetlight and the Canadian Parliament, West Block Building, in Ottowa. He has lectured and taught at lighting industry events and lighting programs worldwide. The firm has received a number of lighting awards including the IES Lumen Award of Excellence and the IALD Award of Excellence, and in 2010, the firm's work was the subject of a solo exhibition at the Aedes Architecture Forum in Berlin.

Melanie Taylor, Vice President Lighting Design, WSP, New York
LEED BD+C, IALD
Taylor heads the architectural lighting design studio in her firm's New York office, bringing with her more than 20 years of experience. Integrated lighting is the key to revealing client aspirations and content-rich architecture, and she has applied this belief to a wide variety of projects that include airports, corporate headquarters, and healthcare environments. She has won multiple International Interior Design Awards for lighting, has been an instructor at the Art Institute of Seattle, and is a steering committee member and judge for the U.S. Department of Energy's Next Generation Luminaires Competition.

Eli Meir Kaplan

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Patricia Glasow

interview by Elizabeth Donoff
photo by John F. Martin

"I look at architecture from an audience perspective. What do I see and experience as I move through the space? I liken the architecture profession to the theatrical profession: owner as producer, architect as director/set designer, interior designer as costume designer, and lighting designer as lighting designer. That remains unchanged."

Like many of her colleagues, Patty Glasow got her start in lighting in high school when she caught the theater bug. Her early training, however, was special: The school was affiliated with a professional roadhouse were musicians such as Bette Midler, Joni Mitchell, and Frank Zappa performed, and she got firsthand training in lighting, rigging, and sound—anything that had to be set up for the shows.

After graduating from UCLA, Glasow worked for Strand Lighting (at the time named Strand Century) as a product representative for video equipment for television, theater, and motion pictures, as well as control systems. She then worked for Disney in what today is known as Walt Disney Imagineering. Those first four years proved invaluable and served as her transition to architectural lighting and the firm she has led and helped grow for the past 31 years: San Francisco–based Auerbach Glasow French (AGF).

Who have been some of the influential people in your career?
My high school technical theater teacher, Diane MacDonald. She taught me the essentials of theater. Tharon Musser: She was called the dean of American lighting designers. She used the first computer lighting console on Broadway. And Len Auerbach: Seeing how he works as a designer and businessman, the consummate creative collaborator, has been very influential.

Is there a text that's influenced you?
Stanley McCandless' book on theatrical lighting—*A Method of Lighting the Stage* (1932). It's out of date, but when I started, that was one of the few books available. The other is Richard Pilbrow's *Stage Lighting* (1970). I think it's in that book that he talks about the concept of single-source lighting. It fascinated me because it's the simplicity of a real primal light.

How has lighting practice changed?
There's just so much more of everything. It's more complicated, more technical, more international, and more code requirements.

What is AGF's design philosophy?
It's really about approach and working method, and an attitude of how we work. It's not about a style or a look. We're program-driven and process-oriented, so it really depends on the project. We're very collaborative with our clients.

How have LEDs and new advances in control systems expanded the designer's toolbox?
It pushes your creativity. You're always learning, and that opens up new ways of doing things. The fundamentals of design don't change, just the tools. •


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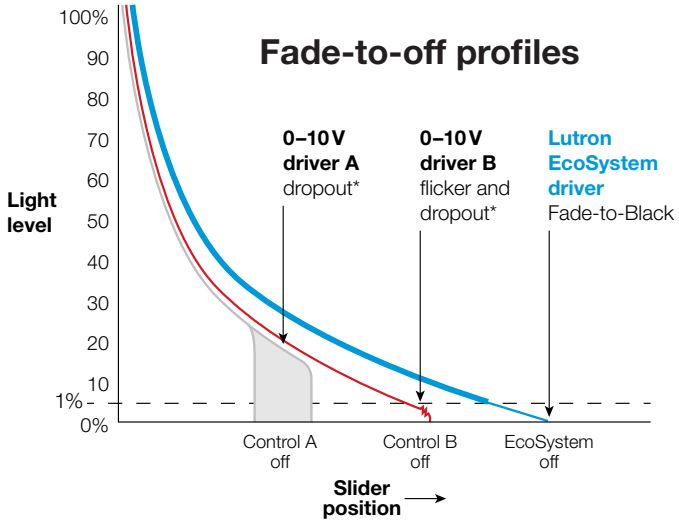

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