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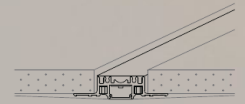
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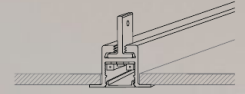
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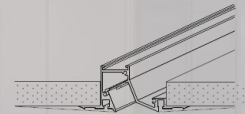
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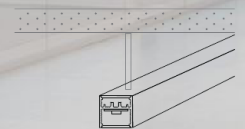
bezel for grid ceiling



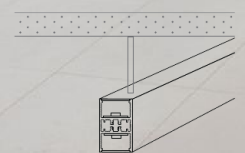
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The lobby of Generator Amsterdam

FEATURES

- 47 CONSUMER APPEAL
Retail and hospitality projects need to make an impression to create their brand identities and retain customers, and these four projects show that lighting is a significant part of the design equation.
- 48 SWIFT & SONS
- 50 BARNEYS NEW YORK DOWNTOWN FLAGSHIP
- 54 GENERATOR AMSTERDAM
- 56 HYATT HERALD SQUARE LOBBY

DEPARTMENTS

- 10 COMMENT
Who “owns” lighting design? plus Letters to the Editor
- 14 BRIEFS
The Brandston Partnership turns 50; an award-winning light tunnel; and the National Museum of African American History and Culture on the National Mall opens
- 21 REPORT
Retailers are adopting VLC technology to customize the shopping experience for retailers and customers alike
- 28 IN FOCUS
Page at Reagan National Airport
- 32 TECHNOLOGY
Though advancements in OLEDs have lagged behind those of LEDs, the diffuse light source is becoming more viable for widespread use
- 42 PRODUCTS
Luminaires that steal the spotlight—lighting for retail and hospitality applications
- 64 ONE-ON-ONE
Interview with lighting designer Ann Kåle, of Ann Kåle Associates in Santa Barbara, Calif.

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On the Cover: Barneys new flagship store in the Chelsea neighborhood of New York City; Photo: Scott Frances/OTTO

Nikolas Koenig



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WHO “OWNS” LIGHTING DESIGN?



This past December, Apple obtained a patent for a ceiling lighting system that the company has already started to unveil worldwide as part of an update to the design vocabulary for its “next-generation” retail locations. The Brussels store, which opened in September 2015, was the first to debut the new ceiling. Closer to home, it can be seen in the Chestnut Hill, Mass., location (right). U.S. Patent No 9,217,247 details a wall-to-wall illuminated ceiling panel system with intermittent linear light tracks for small-aperture fixture heads. In a Dec. 20, 2015, “60 Minutes” segment with Charlie Rose, Apple’s senior vice president, retail and online stores, Angela Ahrendts, noted that the company feels this uniform illumination strategy creates a better retail atmosphere and, in turn, a better customer experience. It’s all part of the new store concept envisioned by Jonathan Ive, who in May 2015 became chief design officer of Apple’s design department in addition to leading the company’s hardware and software divisions.

Rather than treat the ceilings of its new stores as a conventional opaque surface dotted with points of light, Apple is adopting another lighting solution: the luminous ceiling. The concept is not new. One of the most famous is the ceiling that lighting designer Richard Kelly and architects Ludwig Mies van der Rohe and Philip Johnson developed in partnership with lighting manufacturer Lightolier in 1957 for the Seagram Building in New York.

The extent to which obtaining the patent is an indication of whether Apple is, or is not, dipping its toe into architectural lighting remains to be seen. Nonetheless, the patent should be on the lighting design community’s radar, for it does raise significant questions about whether a lighting detail (or for that matter an architectural or building-construction detail) is something that should be patented. It’s not the first time Apple has obtained an architectural patent. In October 2013 it obtained one for the curved glass stairs in its retail locations, and earlier that year the company trademarked its store designs. Basic construction methodologies live in the public domain, and a luminous ceiling is an often-used

lighting strategy. Now that Apple has a patent for its luminous ceiling, do lighting designers and architects expose themselves to some type of risk if they implement a luminous ceiling strategy? And, by extension, what risk might there be for lighting manufacturers or a lighting components company whose products are part of an overall ceiling lighting system?

Of course, there have been numerous patent infringement cases among manufacturers, as they jockey to protect their products’ technology platforms. As the industry has transitioned to LEDs, these product-specific lawsuits are occurring with significant frequency. One way



the industry has addressed this is through licensing programs, the most notable being Philips’ EnabLED Licensing Program for LED Luminaires and Retrofit Bulbs launched in 2008.

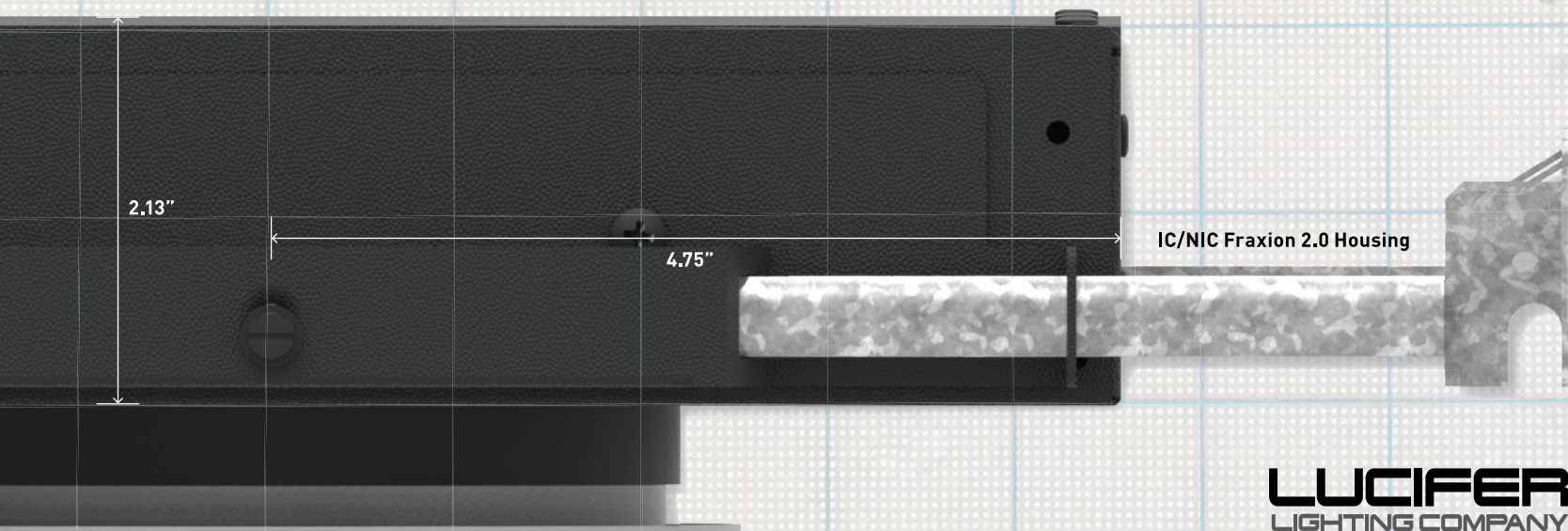
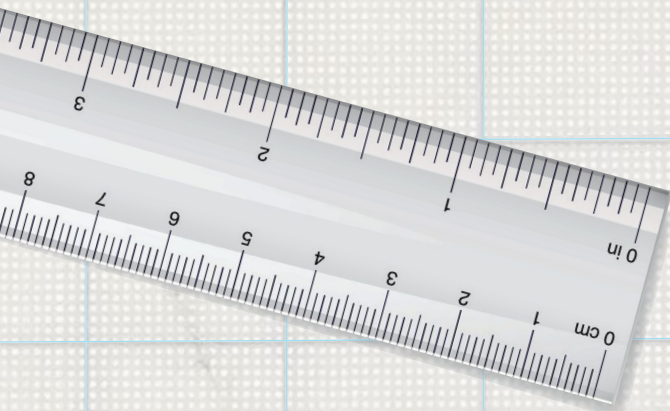
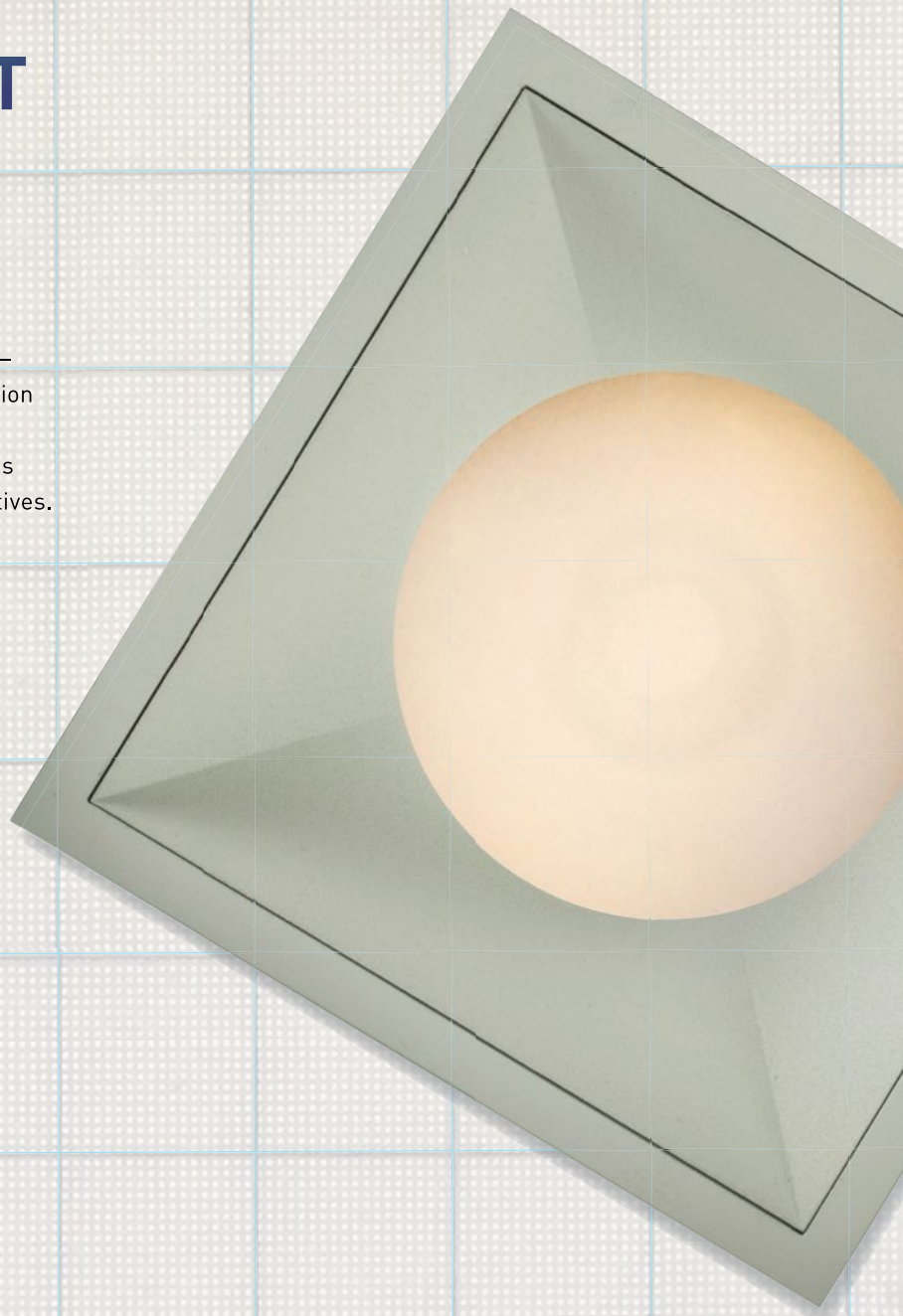
For designers, it’s an interesting issue of precedent and how we go about protecting authorship. In thinking about who owns a design, the question is: Where do you draw the line? Is it about a technical solution, a design concept, an aesthetic look? It’s certainly something to think about as lighting becomes the delivery platform for connected technologies and nonlighting companies enter the lighting market. •

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IN RESPONSE TO "CAN LIGHTING'S PAST BE SAVED?"

I truly appreciated your editorial "Can Lighting's Past Be Saved?" (July/August 2016, bit.ly/2bfvIJ4). While we lighting designers practice the most ephemeral and abstract aspect of the architectural design profession, we all hope that our lighting projects endure. Although we know the likelihood that most of our work will be churned out of existence at some point, there are some iconic designs that we will go out of our way to view. One of those was Richard Kelly's design for the Four Seasons in the Seagram Building (shown) as well as Edison Price's remarkable lighting system. I expect that all of us have a list of lighting installations that we consider precious and feel are worth preserving or at least adapting to new, more durable technologies.



Perhaps the Four Seasons will serve as our Pennsylvania Station—the spark that ignites our vocal advocacy for the preservation of lighting design masterworks in recognition of our contribution to the quality of the built environment.

Mark Loeffler, IALD, LEED FELLOW
Director, Atelier Ten
Environmental Design
Consultants + Lighting
Designers, New Haven, Conn.

Hurrah! Your publication has noted an urgent need. Since 1983, Building Conservation International has been proposing to Lightfair and other national lighting conventions to present lectures on extending—with lighting—the life, value, and usefulness of existing historic properties erected prior to World War II. They have been rejected without explanation. Such training is also lacking in most institutions, except for Notre Dame University.

Retaining architectural "roots" to learn from and to enjoy is relevant today. It can eliminate each generation having to reinvent the wheel for empirical procedures developed over centuries of trial and error, once known, but now forgotten or no longer taught. This knowledge means profit, progress, and energy savings. Attractive "pre-war" real estate always commands a premium. With the shortage of empty space in cities, wise owner-developers are profitably revitalizing well-located, well-designed, and well-constructed pre-1940 structures. To needlessly level these buildings to erect taller, but inferior, ones that won't last the mortgage is a waste of time, effort, energy, and money.

Gersil N. Kay, IESNA, AIA/HRC
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THE BRANDSTON PARTNERSHIP CELEBRATES 50 YEARS

Established in 1966 by lighting pioneer Howard Brandston in New York, the Brandston Partnership has worked on more than 5,000 projects around the world during its half-century. Although Brandston has since retired from day-to-day practice, the firm, under the leadership of Robert Prouse, Chiming Lin, Jungsoo Kim, Wai Mun Chui, Chou Lien, and Scott Matthews has never wavered from Brandston's design philosophy: We live in a visual culture and only by understanding the intricacies of light can one make spaces for people. With a portfolio that includes some of the most iconic projects of the past five decades, such as Expo '67 in Montreal, the relighting of the Statue of Liberty, and the Petronas Towers in Kuala Lumpur, Malaysia (shown), the firm has focused on its recent expansion in Asia, where it first started working in the 1980s. It opened a Shanghai office in 2003 and an office in Singapore this year. The result is a thriving global practice that numbers well over 80 designers. •



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IN THE BEST LIGHT

In July, Böblingen, Germany-based engineering company Eisenmann received a 2016 Red Dot Award for Product Design in the subcategory of Industry, Machinery, and Robotics for its VarioInspect light tunnel. Designed to create a uniform illumination environment in which to inspect the quality of automotive paintwork, the free-standing aluminum arches that form the structure serve double duty as the light fixtures themselves. Each arch is fitted with 15 adjustable linear LED light strips that can change color temperature from 2700K warm-white to 6500K cool-white, according to what best suits the color and gloss level of the vehicle being inspected, so that paint application inconsistencies can easily be detected. The tunnel also provides compressed air supply lines, water, and power integrated into the floor for further stages of inspection. •





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USHERING IN A NEW DAY

The National Museum of African American History and Culture (NMAAHC) in Washington, D.C., opened on Sept. 24. Thirteen years in the making, the NMAAHC, which is part of the Smithsonian, is located on a 5-acre parcel adjacent to the Washington Monument on the National Mall. The 400,000-square-foot, LEED Gold building is the collaborative effort of the Freelon Group, Adjaye Associates, Davis Brody Bond, and SmithGroupJJR. The distinctive façade design—the Corona—is composed of 3,600 bronze-colored cast-aluminum panels. Lighting design firm Fisher Marantz Stone oversaw its illumination, locating fixtures behind the panels so that the building glows from within at night while meeting the strict light-level guidelines for the Mall. The project is unique in that 60 percent of the structure is below grade. This is where the history galleries are located, and it's where you'll find the Contemplative Court, a water- and light-filled area for quiet reflection. Read more at bit.ly/AL_NMAAHC. •



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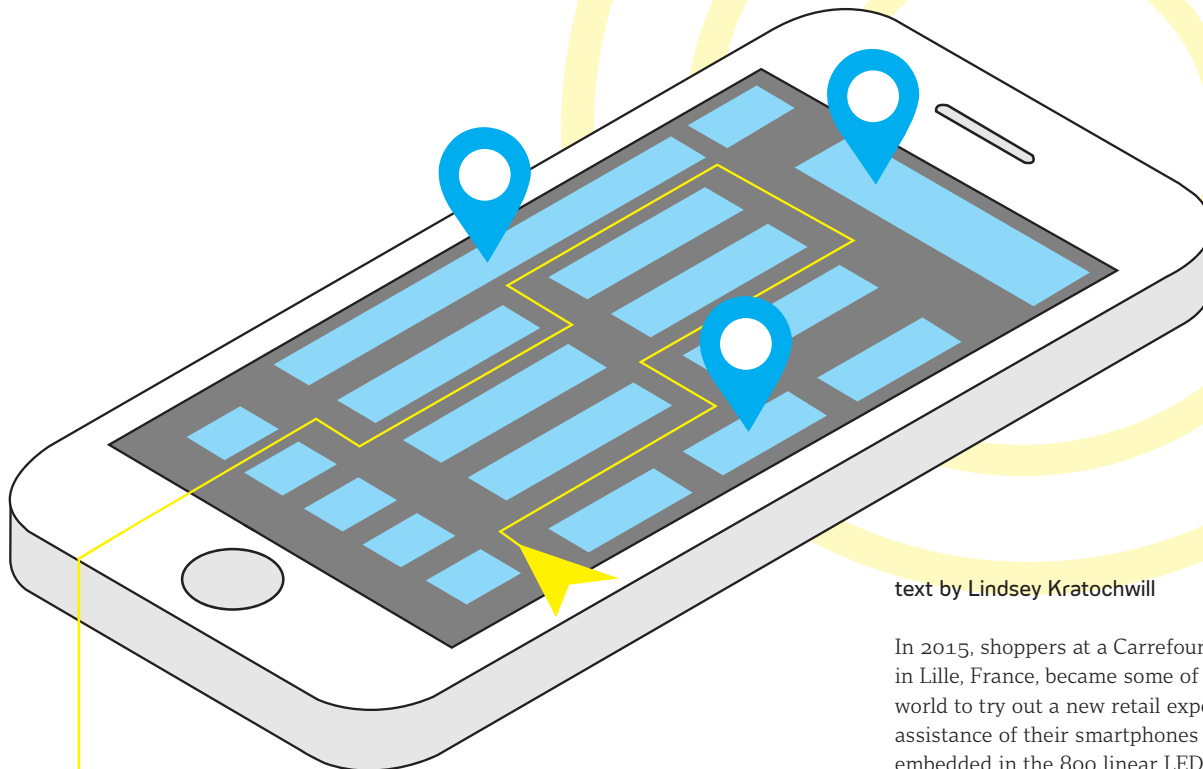
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SMART SHOPPING

Retailers are adopting visible light communication technology to customize the shopping experience with data gathering and information delivery via LED fixtures.



text by Lindsey Kratochwill

In 2015, shoppers at a Carrefour supermarket in Lille, France, became some of the first in the world to try out a new retail experience: With the assistance of their smartphones and technology embedded in the 800 linear LED fixtures overhead, they were directed to the exact location of the products on their list. The technology that enables this experience to work—visible light

communication (VLC)—is one of the latest evolutions in smart lighting, in this case offering retailers improved customer data collection, and shoppers a highly customized in-store retail experience.

So far, only a few lighting manufacturers are exploring VLC. Philips, which piloted the technology with Carrefour, has been working on VLC-enabled LED luminaires for the past decade, and it holds one of the foundational patents for the technology. The company is joined by other lighting manufacturers including Current, Powered by GE and Acuity Brands in their collective efforts to design luminaires that incorporate VLC technology. With the near ubiquity of smartphones and the rise of online retailers as a threat to brick-and-mortar stores, technologies that can help retailers to better reach the consumer at the traditional point of sale are beginning to enter the marketplace.

THE POTENTIAL FOR VLC

VLC technology relies on LEDs' programmability. While fluorescent, incandescent, and halogen lamps deliver a steady stream of light, LEDs can be modulated to flicker at specific intervals. Although imperceptible to the human eye, the light creates a unique pattern when turning on and off. That sequence is captured by customers' smartphone image sensors, and with help from a companion app the data is turned into precise location information—essentially, an indoor GPS.

Because GPS pinpoints users' locations with satellites, the technology that powers smartphone maps does not typically work indoors. For years, technologists have tried to come up with a solution,

testing Wi-Fi, ultrasound, and Bluetooth low energy (LE). Prior to the emergence of VLC, Bluetooth LE was the prevailing choice, thanks to its relative ease of installation. While Bluetooth LE works regardless of where the smartphone is on the user's person, VLC requires the device to be uncovered and oriented with its screen-side camera facing the ceiling. However, Bluetooth LE is less precise than VLC, with an accuracy of a couple of meters, compared to VLC's 10 centimeters (3.93 inches).

It's that level of accuracy that brick-and-mortar retailers are after. For example, if a customer comes into the store to buy a loaf of bread, they could take their smartphone, orient its screen-side camera toward the ceiling, and

This Carrefour supermarket in northeast France is pioneering the use of VLC in its overhead LED fixtures as an indoor version of GPS to guide customers to the products they want.



open up the retailer's shopping app that they had previously downloaded. The apps typically incorporate a shopping list function, so the user can create a list of items that they intend to purchase based on the store's inventory. The app then turns that list into a personalized map, drawing a route from the exact location of one product to another, and pushing coupons or other notifications along the way. So, the customer tells the app that they are looking for a loaf of bread and it takes them there.

With VLC, location information is transmitted via the strobing of the LEDs, which is imperceptible to the human eye, while further alerts, promotions, and product information is delivered over Wi-Fi or the phone's cellular network service. The level of data that can be collected varies. For example, Acuity Brands, which sources its VLC technology from Qualcomm's Lumicast for its ByteLight indoor positioning technology, offers such services as heat maps and data analysis to identify merchandising hotspots. The technology is equally usefully for back-of-house operations, providing product tracking in stockrooms, and allowing workers to locate a customer in the store who has used the app to indicate that they need assistance.

UNDERSTANDING THE CHALLENGES

While retail is ahead of other industries in adopting many LED systems, they're holding back on VLC. One contributing factor is that the use cases for retailers gathering consumer data and pushing out coupons and other notifications are few—a consequence of their hesitancy to install the systems in the first place. Another, perhaps bigger, challenge stems from LEDs' inherent benefit: a long life cycle. "We tell retailers that the LEDs they put in the ceiling are going to last for 10 to 15 years," says Maulin Patel, general manager of intelligent enterprises at Current, Powered by GE. "You can put in an LED with no bells and whistles, and wait for another 15 years until you can upgrade it and make it smarter. Or, you can go with smart LEDs [from the start]." With a new technology such as VLC, Patel says, many retailers would rather watch their competitors work out the kinks than be the pioneers with this new platform.

Although lighting rep agencies are often the ones to work with facility or utility managers when selling new systems, a key stakeholder in the integration of indoor positioning technology is the marketing and merchandising team. "It's a multi-touch sales process in which we have to discuss value in many different contexts," says

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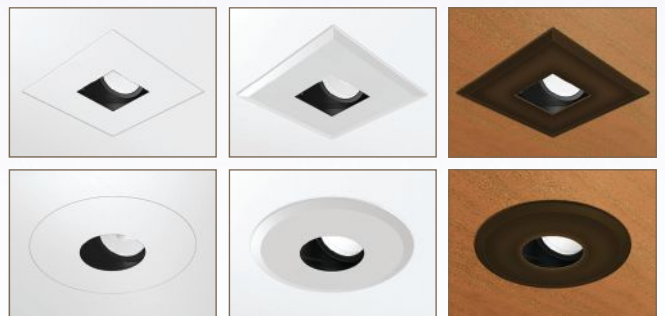


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Dan Ryan, vice president of product, IoT solutions at Acuity Brands. “Our core is energy-efficient LEDs and controls, but we have to tell that story side-by-side with the story about indoor positioning.” Many use cases for VLC in the retail environment are still to be discovered, further delaying the conversation.

The richness of the data and the effectiveness of the service relies on shoppers not only choosing to opt in, but opting in even though it means giving up a degree of anonymity, particularly in the case of the location identification feature. Lighting manufacturers and retailers have responded to consumer privacy concerns by keeping VLC voluntary. For one, shoppers must not only have on their person a smartphone with the retailer app downloaded in order for VLC to track their movements, but the user also needs to hold the phone with the camera facing the overhead luminaires. That’s all much more intentional than a Bluetooth beacon, which tracks customers by pinging the phone (held in hand or stowed in a pocket or purse) using a radio signal.

Current, Powered by GE’s VLC-based apps allow shoppers to use the indoor navigation tools regardless of whether they give the app permission to collect their data. And Acuity Brands’ ByteLight indoor positioning technology combines Bluetooth LE and VLC, allowing customers to benefit from in-store tracking, for which they must opt-in, even when the phone’s screen and camera are not facing the luminaires. Such integration could make it easier for customers to use the technology, encouraging adoption. The company intends to provide retailers with mobile VLC software that can be integrated into their own apps. “With that, [retailers are] free to do whatever they want,” Acuity’s Ryan says. “They can build a couponing experience; they can build navigation experience.”

EARLY ADOPTERS AND APPLICATIONS

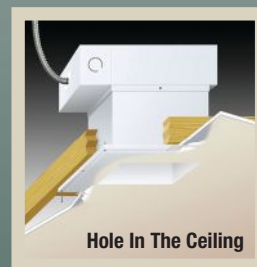
VLC is still an emerging technology, but early adopters are exploring its potential. One example is food retailer Aswaaq, based in the United Arab Emirates, who installed Philips’ VLC lighting last year. The retailer is working with digital



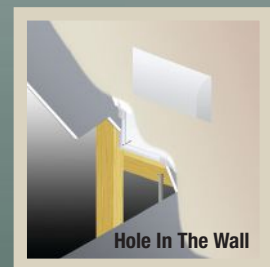
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Aswaaq, a supermarket chain in the United Arab Emirates, began experimenting with Philips' VLC technology last year, and is releasing its companion app this fall.

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With a new technology such as VLC, many retailers would rather watch their competitors work out the kinks than be the pioneers with this new platform.



indoor mapping company Aisle411 to build its companion app—which will include a shopping list feature similar to Carrefour’s—and plans to release it to the public at one of its locations this fall. The retailer then will assess customers’ responses to VLC before deciding whether to roll it out to the rest of its locations.

Meanwhile, Current, Powered by GE, is putting together an “ecosystem” of software vendors, Patel says, who will contribute apps to the platform that their fixtures will use. One app, for example, will target clothing retailers to track

inventory to determine if a dress shirt has been put on the wrong display rack.

In Carrefour’s VLC pilot, the company’s app was downloaded approximately 4,000 times. Shoppers received coupons—a decision based on survey data indicating that customers wanted promotions but had trouble finding them in-store. While Carrefour is still analyzing the data to determine whether or not to implement VLC in more locations, the company is also looking into other ways to use the technology. For starters, they’ve created a Web-enabled shopping cart that relies on VLC for location services and features a touch-screen interface to assist shoppers in finding products.

The potential for VLC extends beyond retail to include object-tracking in factories and warehouses, optimizing workflow in a healthcare environment, visual zoning or geo-fencing, and more applications in which there is LED overhead lighting and a workflow or process to optimize. “There are so many things that we are doing in different spaces,” Patel says. “It’s a very exciting technology and an exciting time.” •

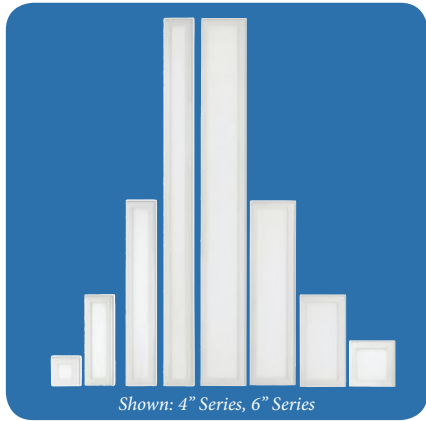


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Shown: 4" Series, 6" Series



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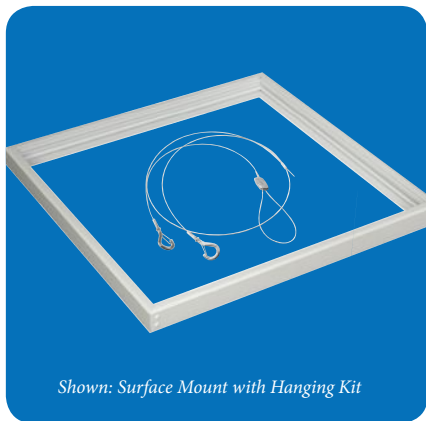
Shown: 4" to 12" Square Downlights



Shown: 4" to 24" Round Downlights



Shown: 1'x1' to 2'x4' Panels



Shown: Surface Mount with Hanging Kit



Shown: WLVD-Wireless Dimmer



*Shown: Wireless Ceiling Occupancy Sensor
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PAGE, REAGAN NATIONAL AIRPORT



text by Elizabeth Donoff
photos by Giulio Calisse

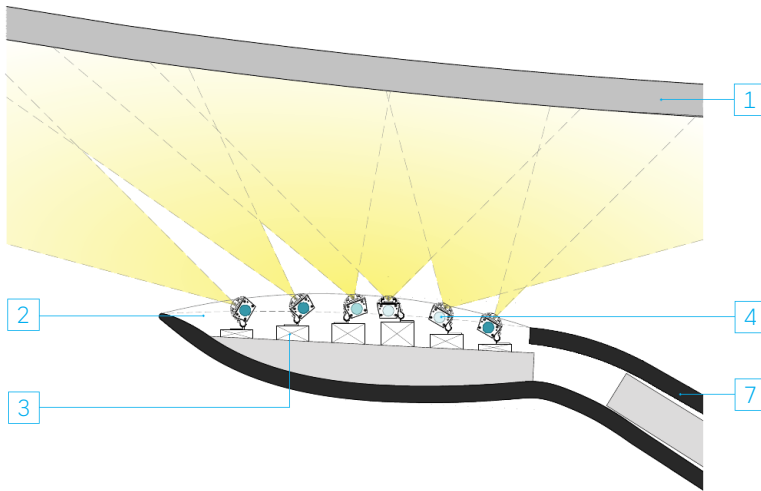
Today's air travel is filled with myriad complexities. From security checkpoints to flight delays, any number of issues can arise as people attempt to get from one place to another. How then to create amenities and accompanying spaces within an airport where travelers can sit and relax, or even grab something good to eat?

One recent example is Page in Terminal A at Reagan National Airport in Washington, D.C. Lighting designers Renée Joosten and Patricia Vallejo of New York-based ICrave were tasked with creating a welcoming spot inside this 1950s building, which was an addition to the original airport terminal (today's Terminal B)

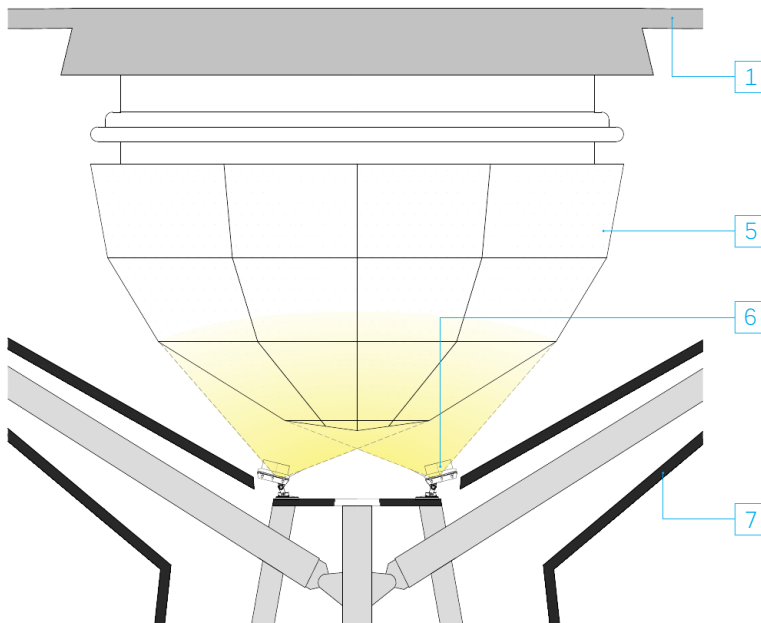
next door, which first opened in 1941. (The larger Terminal C opened in 1997.) Terminal A features a circular, open-space configuration with gates along the perimeter window wall and a ceiling whose structure recalls the look of an airplane propeller. It was this aspect of the space that inspired the designers to develop the concept for Page: one central dining spot for the entire terminal, radiating seating areas, and a feature lighting element emanating from a central column.

The focal point of the space and the lighting design are the 10 white cantilevered "petals." Inside each one are six custom four-channel

PETAL UPLIGHTS DETAIL



CORE UPLIGHTS DETAIL



Legend

- | | |
|--|---|
| 1 Existing ceiling | 4 Custom four-channel linear LED uplights |
| 2 Baffle to keep fixtures from view | 5 Existing speaker dome |
| 3 Blocking for luminaires to avoid fixture shadowing | 6 2700K LED uplights |
| | 7 Petal armature |

linear LED uplights with dynamic-white and amber LEDs. The combination of color temperatures allowed the lighting designers to create a balanced illumination given the abundance of natural light that the round terminal receives throughout the day.

Each LED array is outfitted with different optics so that a fixture's beam spread maps to the curvature of the ceiling above, producing an even wash of light and eliminating hotspots. Emanating from the central column, warm 2700K LED light illuminates the existing speaker dome. These fixtures are equipped with custom frosted lenses, baffles, and three-sided barn doors to prevent unwanted spill light or shadowing.

The project location—an active airport—proved a particular challenge. Joosten notes that they were only allowed to be on site for mock-ups, installation, and fixture focusing, between the overnight hours of 10:00 p.m. and 4:00 a.m. This made the process of developing and fine-tuning the programming for the petals' color-changing sequence, which is set to an astronomical clock, complex to say the least. The program starts one hour before astronomical sunrise, set to 2200K with saturated amber tones. As morning unfolds, the color temperature transitions to 4000K to balance the abundance of noontime light during the lunchtime rush. During sunset and nighttime hours, the crisp white light fades back to warmer color temperatures for a more calming feel. The result is a technically complex lighting solution that creates a sophisticated and inviting design feature while elevating the overall travel experience. •

DETAILS

Project: Page, Terminal A, Reagan National Airport, Washington, D.C. • **Client:** OTG, New York • **Architect:** Alliance, Minneapolis • **Lighting Designer:** ICrave, New York • **Fabricator:** Eventscape, Toronto • **Project Size:** 1,536 square feet • **Project and Lighting Costs:** Not Available • **Code Compliance:** ASHRAE 90.1-2007 • **Watts per Square Foot:** 1.6W

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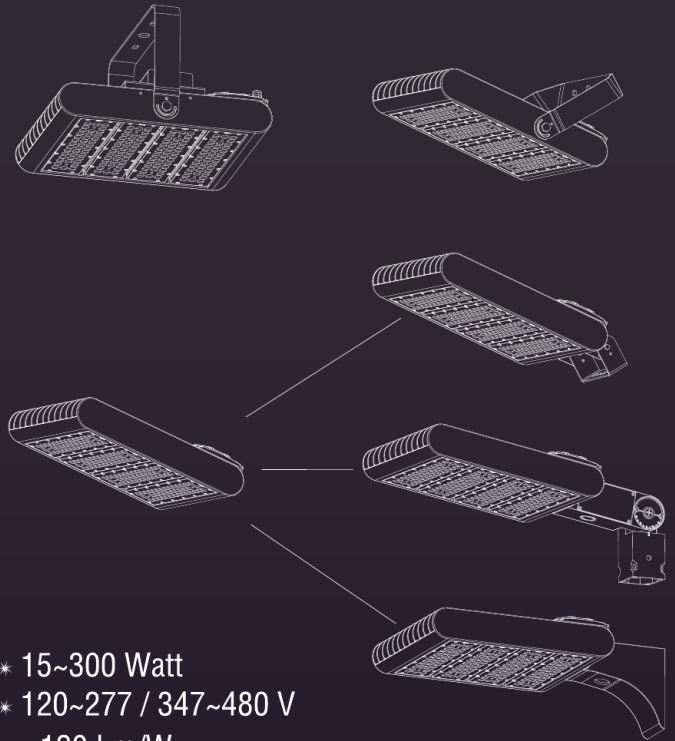
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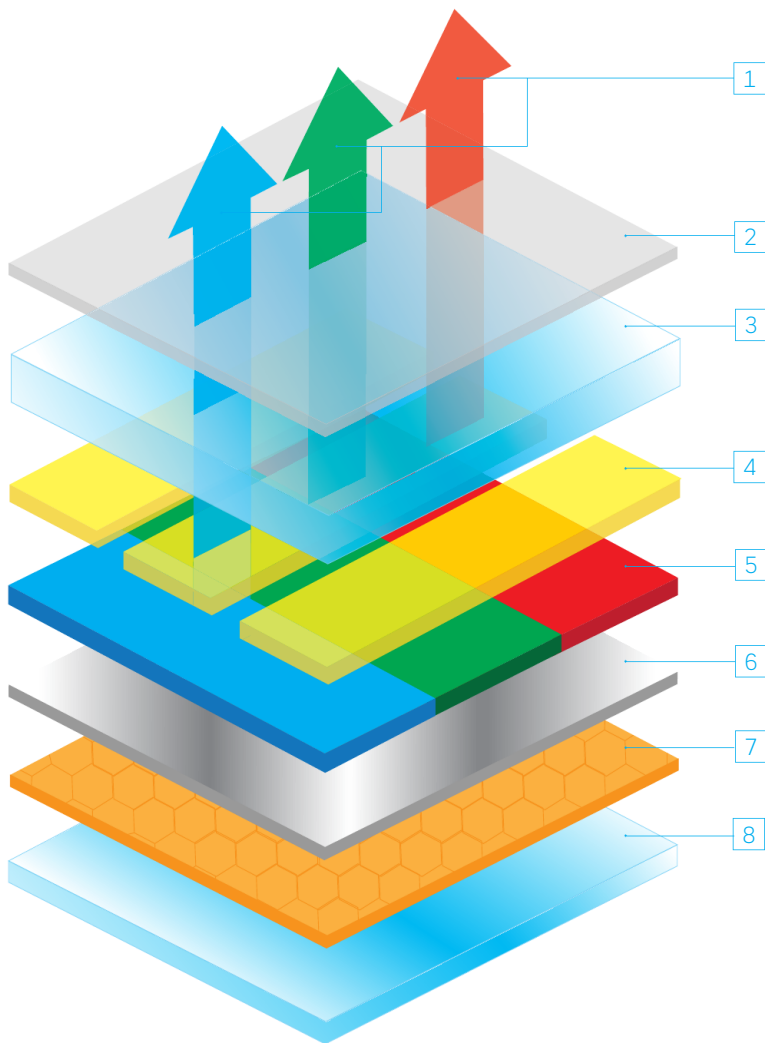
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OLEDs' OBSTACLES

Though advancements in the diffuse light source have lagged behind those of LEDs, the technology is becoming more viable for widespread use.

TYPICAL OLED ARCHITECTURE



Legend

- | | |
|----------------------------------|---------------------|
| 1 Emitted RGB light | 5 Organic compounds |
| 2 External light-extraction film | 6 Cathode |
| 3 Glass substrate | 7 Desiccant |
| 4 Anode | 8 Glass cover |

text by Tam Harbert

Though organic light-emitting diodes, or OLEDs, hold significant potential as a light source with unique application potential, designers will have to continue to wait before the technology is ready for mainstream architectural lighting use. Because of OLEDs' low luminance and diffused output, their applications to date have been limited to signage backlighting, sculptural installations, and conceptual prototypes. The dearth in demand has kept OLED prices high and research and development budgets low as manufacturers focused instead their attention on LEDs and improving the quality and efficacy of those point sources.

But OLEDs are attracting growing interest from lighting designers because of their simplicity, says Giana Phelan, director of business development at Rochester, N.Y.-based OLEDWorks, which acquired Philips' OLEDs business division and Lumiblade platform in 2015. "People are [experiencing] LED overload," she says. "They've had to learn a lot about waveguides and diffusers for LEDs. In comparison, OLEDs are pretty easy. They don't need anything but a driver and [a designer's] creativity."

LEDs VERSUS OLEDs

LED and OLED technologies had measurable penetration in the architectural market around 2006 and 2011, respectively, estimates Naomi Miller, a designer and senior scientist at the U.S. Department of Energy's (DOE's) Pacific Northwest National Laboratory (PNNL), in Richland, Wash. Though they are both solid-state lighting, based on semiconductor technology, their similarities for the most part end there.

An LED is comprised of two electrodes—a cathode and an anode—that produce light when current is applied. Color temperature is determined by the type of semiconductor materials used.

By contrast, an OLED consists of layers of an organic (or carbon-based) compound, such as organometallic fluorescent chelates or electroluminescent polymers, sandwiched between the cathode and anode, and deposited on



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a substrate—typically rigid glass although some flexible materials and roll-to-roll plastics are in development. The organic materials determine the color temperature. The lack of manufacturing lines dedicated to making large OLED panels has limited their availability to small sizes, such as 2 inches square, 4 inches square, or 2 inches by 8 inches.

As in all semiconductor manufacturing, costs are high when the fabrication process is new and volumes are low. Achieving economies of scale requires strong demand, which has yet to materialize for OLEDs. Although the past five years have seen some developments in the technology, few architectural fixtures are commercially available, according to PNNL’s May 2016 report, “OLED Lighting Products: Capabilities, Challenges, Potential.”

According to the DOE’s “Solid-State Lighting R&D Plan,” published in June 2016, a best-in-class LED downlight in 2015 produced 64 lumens per watt (lm/W) and cost \$29 per kilolumen. Meanwhile, a best-in-class OLED luminaire produced 43 lm/W and cost \$870 per kilolumen, 30 times the cost of the LED.

However, the simplistic comparison is unfair for several reasons, says Miller, along with PNNL electrical engineer Felipe Leon. Miller notes that an OLED luminaire would likely serve as a sculptural piece, while an LED downlight, which

is mass produced and an established technology, would serve utilitarian purposes. “Think of comparing a basic ceiling light fixture with a chandelier,” Leon adds.

A more telling indicator may be the unit price of an OLED panel itself. The DOE R&D plan notes that the 2016 manufacturing cost is \$1,850 per square meter. That needs to drop dramatically for OLED lighting to become commercially viable; the DOE is targeting a cost of \$100 per square meter by 2025, according to the report.

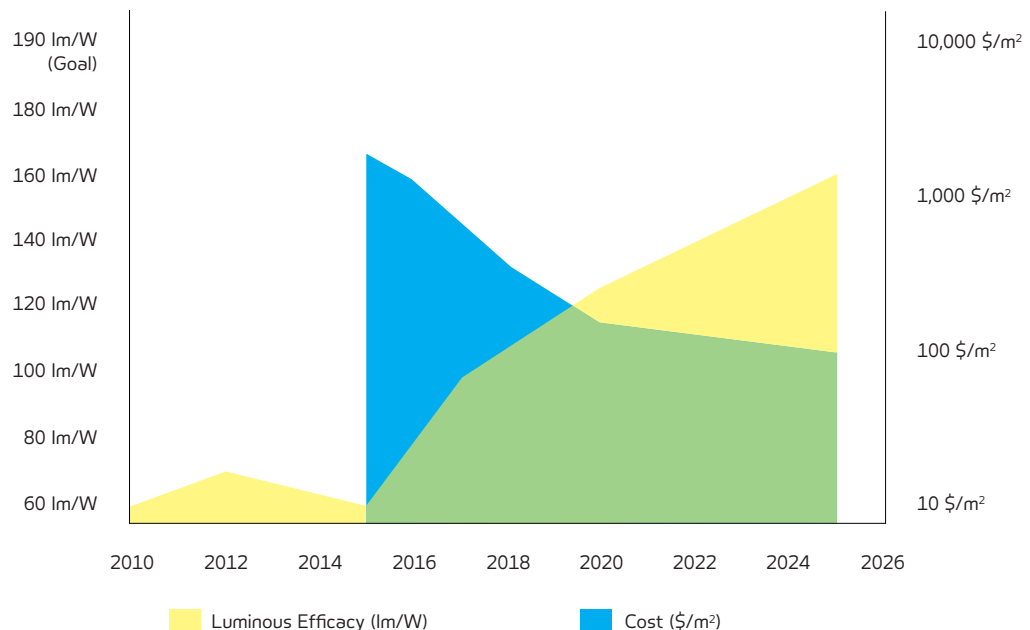
OLED ADVANTAGES

Still, OLEDs are appealing in architectural applications for several reasons. Whereas LEDs are points of directional light, OLED panels emit a uniform amount of soft illumination evenly diffused across their entire surface, with minimal glare. Unlike LEDs, they are cool enough to touch because the heat is distributed across a larger surface. They are also lightweight and extremely thin—less than 2 millimeters thick—and distribute light with a wide beam angle. As such, OLED panels are versatile and can be installed horizontally or vertically, and illuminate a relatively large space.

OLED fixtures also don’t need as many components as their LED counterparts, which require heat sinks and optical devices, such as

Efficacy and cost targets for OLEDs, assuming a CRI exceeding 80 and a CCT between 2580K and 3710K. The 2010 and 2012 efficacy values were achieved in the laboratory. Subsequent values are for commercial panels. Estimated cost values assume manufacturing by traditional methods.

U.S. DEPARTMENT OF ENERGY’S OLED PANEL PROJECTIONS



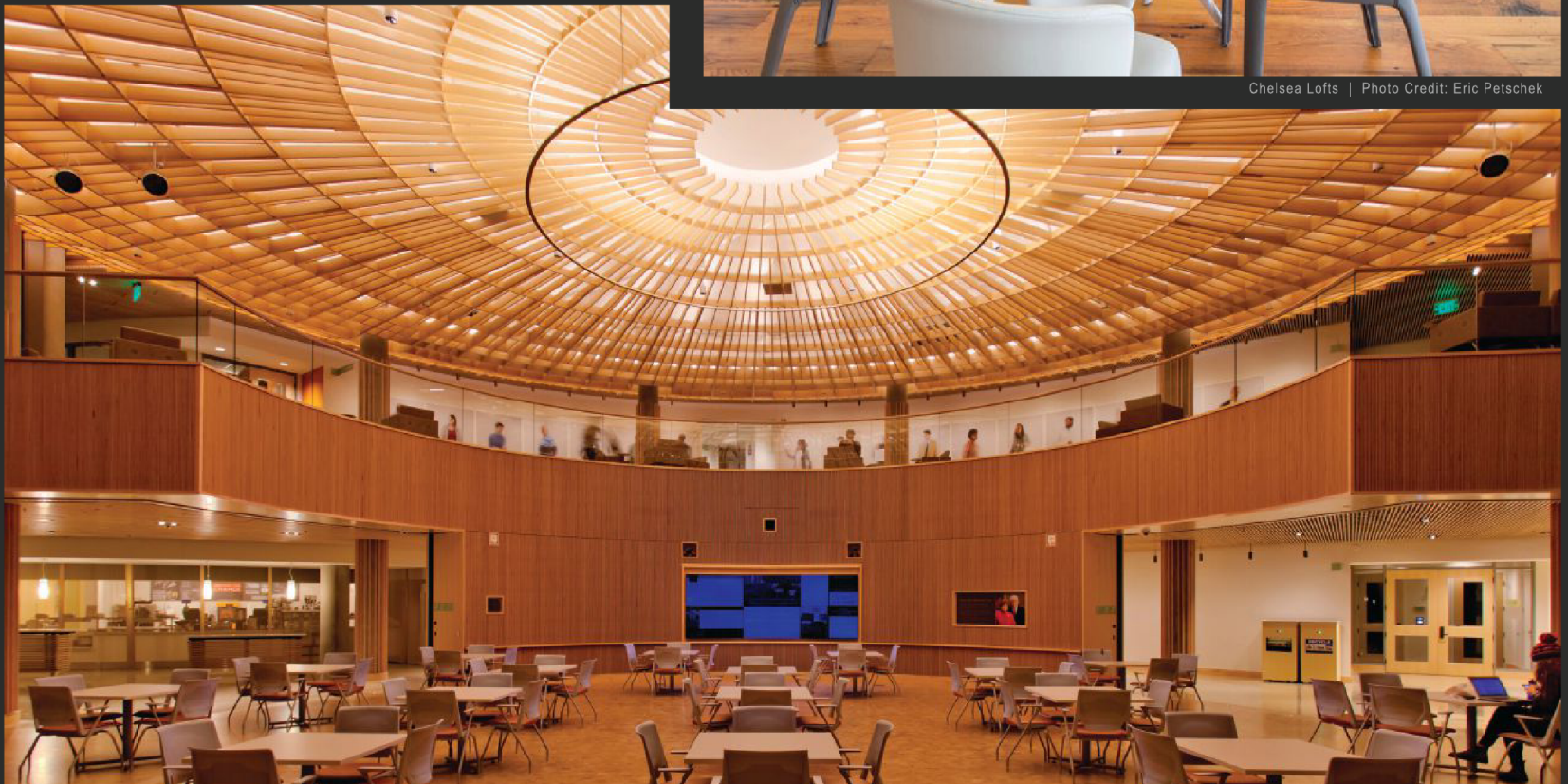
Source: U.S. DOE Solid-State Lighting R&D Plan



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diffusers, lenses, and shades. An OLED panel is innately a diffuse source that does not need a heat sink. "With OLEDs, the panel is the luminaire," Miller says.

Finally, OLEDs can be deposited on flexible substrates and thus can be configured into nearly any shape. They even can be made into a mirror or completely transparent so that they emit light from both faces.

BARRIERS TO ENTRY

Besides cost, OLED technology faces competition in life expectancy and efficacy from LEDs. Although OLEDs have listed lifetimes of 40,000 hours at a luminance of 3,000 candela per square meter—acceptable for decorative lighting—panels pushed to higher luminance levels tend to expire earlier, according to the DOE's "OLED Lighting Products" report. A panel operated at 8,300 candela per square meter—a level appropriate for desktop tasklighting—may have an operating life of 10,000 hours, or 2.5 years.

Efficacy is another challenge. Miller estimates that today's OLED products emit 20 lm/W to 60 lm/W at the panel level, a spec that hasn't budged much in several years. OLEDs' current extraction efficiency is 30 to 35 percent, according to the DOE's R&D plan. The agency would like that number to hit 70 percent by 2020. The OLED industry is currently improving light extraction methods, including films applied to the OLED glass substrate. Internal or external extraction methods alone can increase the efficacy of an OLED panel by a factor of two or more, Miller says.

The selection of drivers not designed for OLEDs' electrical properties also contributes to their inefficiencies. After dissecting several OLED products on the market, Leon found some using two drivers, one for "converting to a voltage, and the other [an OLED driver to provide] the appropriate current level to ... allow for dimmability," he says. He believes luminaire manufacturers "may incorporate added value technology to their OLED products" to justify their cost premium. However, if drivers can be developed to complement the specific electrical characteristics of OLEDs, the panels' overall operation will improve.

Meanwhile, the rapid evolution of LEDs continues. In fact, OLEDs' chief competition today is edge-lit optics, in which LEDs placed along the edge of a panel—typically a plastic, such as polycarbonate or acrylic—use etching, diffusers, and waveguides to distribute light across the surface. Edge-lit panels are thicker than an OLED panel, at about 9 millimeters.

Manufacturers have also started to develop hybrid LED/OLED fixtures that “boost the light output and reduce cost per lumen while maintaining the aesthetic appeal of OLED luminaire designs,” write the DOE R&D plan’s authors. These first generation product offerings include Acuity Brands’ Duet SSL Technology and WAC Lighting’s Hybrid OLED/LED luminaire.

RECENT DEVELOPMENTS

OLEDs could achieve the DOE’s goals as manufacturers ramp up production of displays for mobile devices and televisions. Samsung phones, for example, have used such displays for years, OLEDWorks’ Phelan says. “A lot of people are carrying around OLED screens in their pockets, and they don’t even know it.”

Last year, LG transferred its OLED Light Division from LG Chemical to LG Display, which makes screens for electronics. In March, LG

“A lot of people are carrying around OLED screens in their pockets, and they don’t even know it.”

—Giana Phelan, director of business development, OLEDWorks

Display announced the construction of the “world’s first fifth-generation” OLED light panel factory in Gumi, South Korea, with an initial input capacity of 15,000 1,000-millimeter-by-1,200-millimeter glass substrates per month, starting in 2017.

“The input capacity will increase depending on the market situation,” says Joon Park, vice president of LG Display OLED Light Division; that increase could lead to significant price competitiveness. The company is also investing heavily in additional factories to produce larger television panels and flexible panels for smartwatches and other mobile devices. LG’s OLED Light Division can benefit from these investments, Park adds: “There will be advantages such as integrated purchasing, shared investment, increased productivity, improvement in production infrastructure, and expanded use of technology patents.”



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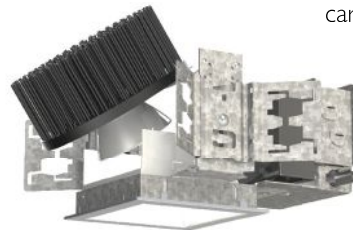


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Meanwhile, OLEDWorks' acquisition of Philips' OLED lighting division included a factory in Aachen, Germany, capable of manufacturing higher volumes and possessing expertise in the "production of quality high-brightness panels," said OLEDWorks' CEO David DeJoy when he announced the acquisition in April 2015.

Both LG and OLEDWorks are currently exploring flexible OLEDs. LG Display demonstrated flexible panels in myriad fixture configurations at Light+Building in 2016. And OLEDWorks has demonstrated a bendable product that uses Corning's Willow Glass, a flexible glass 100 to 150 microns thick that can be rolled up like a sheet of paper.

While OLEDs face barriers, the technology is still in its infancy. LED lighting, in its early years, struggled with many of the same difficulties. The difference, according to the PNNL report, is that "OLED manufacturers have the advantage of having watched and learned from the LED industry working through these problems." As such, OLEDs will likely become a dynamic and versatile source for lighting designers in due time •

SELECT RESOURCES

An introductory list of references on OLED technology and products.

"Solid-State Lighting R&D Plan," by the U.S. Department of Energy, June 2016. Available at bit.ly/2cPTego.

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"2014 Status Report on Organic Light Emitting Diodes," by the European Commission, Joint Research Centre, 2014. Available at: bit.ly/2cC39mj.

"Five Products and Trends Shaping the Market for OLED Lighting," by Hallie Busta, ARCHITECTURAL LIGHTING, March 31, 2015. Available at bit.ly/2c8DW3E.



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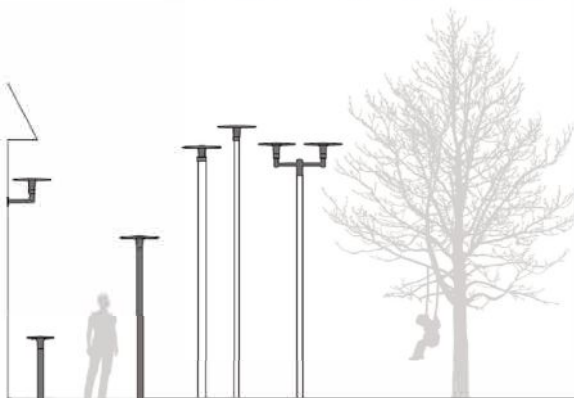
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1



LUMINAIRES THAT STEAL THE SPOTLIGHT

These eight fixtures mix form and function to provide even illumination for retail and hospitality, while showcasing their own streamlined designs.

2



3



5



4





text by Selin Ashaboglu

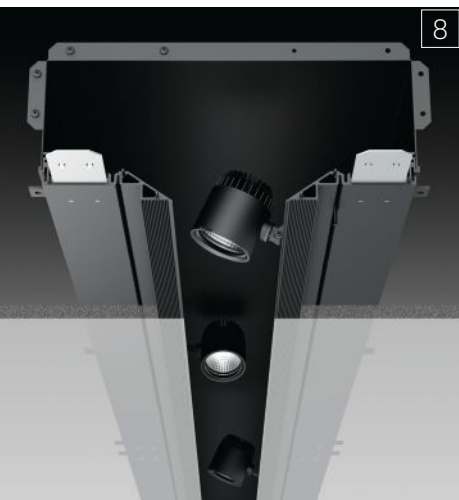
1 Spider, Studio Italia Design • This arachnid-inspired, globular pendant can be mounted individually or in a group. The 8.7W LED fixture measures 4.72" in diameter and can be suspended at a maximum length of 157.48" from the ceiling. Offered in 3000K at a CRI of 80 and delivering 650 lumens, the IP20-rated Spider can be rotated 90 degrees for focusing purposes. It is offered in a chrome frame and four diffuser finishes including matte white, chrome (shown), gold, and rose gold. • sid-usa.com

2 myRoom, Lutron • Designed for hospitality settings, this family of guest room control systems can manage the temperature, illumination, and shading of a room. Available in two packages—myRoom Prime and myRoom Plus—the latter integrates with building management systems, property management systems, door locks, and third-party concierge systems for hotels. It employs occupancy sensors and energy-saving controls. The Plus package comes with custom Lutron system components such as shades, keypads, room controllers, thermostats, and load controls. • lutron.com



3 Giraffa, Pablo • Designed to illuminate desktops or for use as a bedside reading lamp, this high-output, chip-on-board LED luminaire allows for both direct and indirect lighting, thanks to a fully rotatable head. Measuring 13" tall by 2.25" wide, the 4.6W fixture is available in 3000K with a CRI of 90-plus and an efficacy of 56 lumens per watt. Giraffa comes in gloss white lacquer, brushed copper (shown), and black anodized aluminum finishes, with a full range of dimming control. • pablodesigns.com

4 Velato LED, Amerlux • This family of recessed multiple fixtures comes in one-, two-, and three-lamp configurations to create semi-customizable illumination for retail spaces. Available with trims or without, in 16W or 18W, the frame is made of stamped steel with integral mounting bars. Velato is offered in 2200K, 2700K, 3000K, 3500K, and 4000K with a CRI of up to 97 and has a steel driver-housing. The luminaire requires a 120V or 277V system, is zero-to-10V dimmable, and comes with a variety of beam spreads including spot, narrow flood, and wide flood. • amerlux.com



5 Mute, Eureka • The signature feature of Mute, a decorative-style pendant, is its shade, which is composed of 12 polyester acoustic fins made of CNC-cut recycled PET bottles and wrapped in felt. The fins provide a Noise Reduction Coefficient rating of 0.75. The 24W LED luminaire is offered in 3000K and 4000K and uses 120V or 277V. The shade is available in three felt colors: red, charcoal (shown), and beige. • eurekcalighting.com

6 Asterix, Christopher Boots • Inspired by the shape of the asterisk symbol, this luminaire is a modern take on the iconic shape of a traditional lantern. The 19.7"-tall by 19.7"-diameter pendant can be suspended from a 35.4"-long rod and has a matching ceiling canopy. The 106W fixture can be fitted with a warm-white LED (2500 to 2700K), neutral-white LED (2800 to 3300K), and cool-white LED (4000K to 4500K). Asterix is zero-to-10V dimmable and comes in finishes of anodized aluminum and charcoal, polished aluminum, as well as polished brass and lacquer (shown). • christopherboots.com

7 Capture Flush Mount, LBL Lighting • Held in place by a metal band, this 6.6"-diameter LED orb can be mounted vertically or horizontally on either a wall or a ceiling. The 27W Capture comes in 3000K with a CRI of 90, and delivers 1,000 lumens. The fixture requires 120V or 277V power and is dimmable by use of a low-voltage electronic dimmer. Available in satin nickel (shown) and matte white finishes. • lblighting.com

8 EF400 System, LF Illumination • This aluminum recessed linear channel system can now be fitted with fully adjustable EF408 LED heads. The accent light fixture heads come in 9W, 14W, 21W, and 28W LEDs with an output of 800, 1,100, 1,500, and 1,700 lumens, respectively. These 3.15"-diameter luminaires are offered in 2700K, 3000K, 3500K, 4000K, and 5000K at a CRI of 80 or 95. The system can be mounted on an aluminum extension arm, side-channel magnetic mount, or EF400-EF4BNS channels (shown). Dimmable and suitable for damp locations. • lfillumination.com



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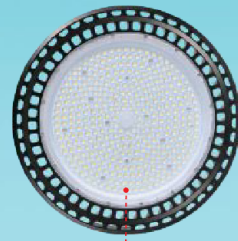
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CONSUMER APPEAL

text by Elizabeth Donoff

Every project type has its own specific application criteria, and lighting for retail and hospitality projects is no different. Retailers, restaurateurs, and hoteliers need to make an impression, and they jockey to create unique brand identities that will draw customers, preferably repeat customers. It's about making a statement—however subtle or extreme—to create a signature experience that stands out from the competition.

The four projects on the following pages showcase the diversity of illumination solutions, as the lighting designers were asked to respond to different project scales, programs, budgets, and aesthetic viewpoints. In order to inspire, various degrees of spectacle are used to elevate shopping, dining, and travel beyond everyday experiences to become memorable occasions. Consumers are looking to be engaged. Lighting, in turn, not only has to aid in creating a distinct setting and atmosphere but also highlight the goods and services on display. The goal after all, is to encourage the purchase, whether it be for a garment, a bottle of wine with dinner, or a return stay. •

Bistro area of Swift & Sons
steakhouse in Chicago



Details

Project: Swift & Sons, Chicago • Client/Owner: Boka Restaurant Group, Chicago • Designers: AvroKO, New York • Lighting Designer: Lightswitch Architectural, Chicago • Project Size: 10,000 square feet • Project and Lighting Costs: Withheld • Code Compliance: ASHRAE 90.1-2010 • Watts per Square Foot: 0.8

Manufacturers

Away Brands/EldoLED: Drivers for LED tape light • Crestron: Lighting control system with five presets • Luminii: 3W 2700K LED tape light for lighting details at ceiling coves, countertop edges, and stair treads • Ketro: PAR38 lamps for downlights • Paul Richard George Hospitality: Custom-designed luminaires throughout the project including ceiling-mounted brass plated pendants in concierge area, dining rooms, and bar area and wall sconces in bathrooms • USAI Lighting: 4W 3000K PAR38 LED downlights in dining rooms



SWIFT & SONS, *Chicago*

text by Belinda Lanks

photos courtesy Bokā Restaurant Group

At Swift & Sons, a new steakhouse in Chicago, New York-based design firm AvroKO worked with Chicago-based lighting design firm Lightswitch Architectural to transform a 1920s cold-storage warehouse into a fine-dining location that creates the fictitious headquarters of the very real 19th-century meatpacking tycoon Gustavus Franklin Swift. To carve out distinct zones in the 10,000-square-foot restaurant, the designers created decorative custom pendants for the bistro and two formal dining rooms. Concealed light strips highlight the curves in arches and ceiling coves, which feature custom-designed brass-plated chandeliers. To keep the lighting consistent from day-to-day, there is a lighting control system with five settings, or “scenes.” Switching from early to mid-evening involves a push of a button to create a consistent mood without compromising the look of an old-time fine-dining experience. • [Read more at bit.ly/AL_Swift](http://bit.ly/AL_Swift)



BARNEYS NEW YORK DOWNTOWN FLAGSHIP, *New York*

text by Mimi Zeiger

photos by Scott Frances/OTTO

Barneys New York returns to its Chelsea roots with a glamorous 55,000-square-foot flagship store. Designed by New York-based firm Steven Harris Architects with lighting design by Cooley Monato Studio (CoMoS), the five-story retail space evokes the luxury of the early 20th century through a rich material palette: marble, glass, and metallic surfaces. Emily Monato, CoMoS principal, worked closely with the architectural team to integrate low-wattage LED sources into the merchandise displays. The store's centerpiece is a dramatic spiral stair. Careful to maintain the design integrity of the powerful form, CoMoS installed shielded, in-grade LED uplights in the treads and LED light strips at the handrail. The elegant solution highlights the stair without overpowering it. Just as the shopping experience is made-to-measure for style and a luxurious identity, the seemingly simple pairing of light and materials creates a tailored homecoming for the brand. • [Read more at bit.ly/AL_Barneys](http://bit.ly/AL_Barneys)









Details

Project: Barneys New York Downtown Flagship, New York • **Architects:** Steven Harris Architects, New York, and Lalire March Architects, New York • **Engineer:** Rosini Engineering, New York • **Lighting Designer:** Cooley Monato Studio, New York • **Interiors:** Rees Roberts + Partners, New York • **Project Size:** 52,425 square feet
• **Project and Lighting Costs:** Withheld • **Code Compliance:** ASHRAE 90.1-2010 • **Watts per Square Foot:** 1.91

Manufacturers

Aculux: Ceiling-recessed 14.8W 2700K, 3000K, and 3500K LED downlights throughout the store and 20.6W 3000K ceiling-recessed downlights near window area in fine jewelry department • **Eklipse:** 7.5W 3000K linear LED light tape to uplight "Amoeba" coves in sales areas • **Feelux:** 3.5W-per-linear-foot 3000K LED fixtures mounted under banquettes and lounge benches at Freds • **GE Lighting:** Lightech LED driver for fixtures at freestanding jewelry cases • **LED Linear:** 4.7W-per-linear-foot 3000K light tape for spiral stair handrail
• **Loupi:** 1.5W 3000K LED accent light at freestanding jewelry cases • **MP Lighting:** 1W 3000K in-grade LED uplight installed every third tread on the spiral stair; 2.5W 3000K tread uplight • **OptoLum:** 8W-per-linear-foot 3000K LED linear fixture for undershelf lighting

GENERATOR AMSTERDAM, *Amsterdam*

text by Clay Risen

photos by Nikolas Koenig

Generator Amsterdam is the latest in a new breed of hostel that trades barebones amenities and cramped quarters for high design and funky social spaces. To make it work, DesignAgency, the Toronto firm in charge of the interiors, worked closely with Blom & Blom, an Amsterdam company that specializes in rehabilitating antique, industrial lighting, often from the former East Germany. Blom & Blom installed pendant fixtures throughout the building, as well as the lighting feature in the Auditorium Bar (below), in the building's former lecture hall. Seventy custom-designed pendants were fashioned from laboratory glassware and fitted with 1.5W 2700K LED lamps. But it is the fixtures in the lobby—three massive fluorescent fixtures called Black Rhinos—that make the first and most lasting impression. Designed to illuminate large factory spaces, the fixtures' industrial heft provides a counterpoint to the light- and whimsy-filled lobby. • [Read more at bit.ly/AL_GA](http://bit.ly/AL_GA)





Details

Project: Generator Amsterdam, Amsterdam • **Client:** Generator Hostels, London • **Lead Designers (interiors):** DesignAgency, Toronto • **Lighting Designer:** Artec, Amsterdam • **Project Size:** 6,995 square meters (75,294 square feet) • **Project and Lighting Costs:** Withheld • **Code Compliance and Watts per Square Foot:** Not applicable

Manufacturers

Alexander & Pearl: Area Black & White Industrial Swivel Wall Light in stairwells • **Anglepoise:** Original 1227 Giant floor lamp in café; Original 1227 brass table lamp and wall sconce in rooms; and Original 1227 brass table lamp and bedside wall fixture in luxury suite • **Blom & Blom:** Large pendants and column lighting for lobby; pendants above bar in the café; feature lighting in the Auditorium Bar; luminaires for basement bar; Blackbird pendant in rooms; and pendants and bathroom wall sconces in the luxury suite • **Flos:** Arco floor lamp in Auditorium Bar • **Holloways of Ludlow:** Stirrup floor lamp in basement bar • **Karman:** Via Rizzo 7 pendants in breakfast area • **Merci:** Bathroom wall sconce for rooms • **Moooi:** Paper chandelier in steel-frame house in café • **Resident Studio:** Cross pendant in library lounge • **Zero Lighting:** Daikanyama ceiling pendant in breakfast area and entrance

Details

Project: Hyatt Herald Square Lobby, New York • **Interiors:** VLDG, Edgewater, N.J. • **Architect of Record:** Nobutaka Ashihara Architect, New York • **Engineer:** Edwards & Zuck, New York • **Lighting Designer:** PHT Lighting Design, New York • **Project Size:** 3,417 square feet (first floor front of house) • **Project Costs:** Withheld • **Lighting Costs:** \$30 per square foot (lobby scope of work) • **Code Compliance:** ASHRAE 90.1-2007 (with additional decorative lighting and retail allowance) • **Watts per Square Foot:** 0.85

Manufacturers

Contract Lighting: Ceiling-recessed small-aperture (narrow-beam) downlight with MR16 LED lamp • **Flos:** Piani decorative lamp at guest desk • **Future Perfect:** Decorative glass pendants at bar—special-edition Clamp Pendant by Lindsey Adelman • **Ligne Roset:** Decorative pendant at lounge • **Philips Color Kinetics:** iW Fuse Powercore dynamic-white LED wall grazer with a dynamic range 2700K to 6500K with iPlayer3 DMX interface (4-foot fixture, each 50W) behind clerestory and back bar glass blocks • **Soraa:** 9.8W 2700K MR16 LED lamps for ceiling-recessed downlights • **Stickbulb:** 3000K LED wooden decorative stick pendant at lounge and Torch table lamp at reception desk • **WAC Lighting:** InvisiLED Pro 2—4W-per-linear-foot 2700K tape light—for ceiling cove light, behind wood planks, and bar liquor shelf



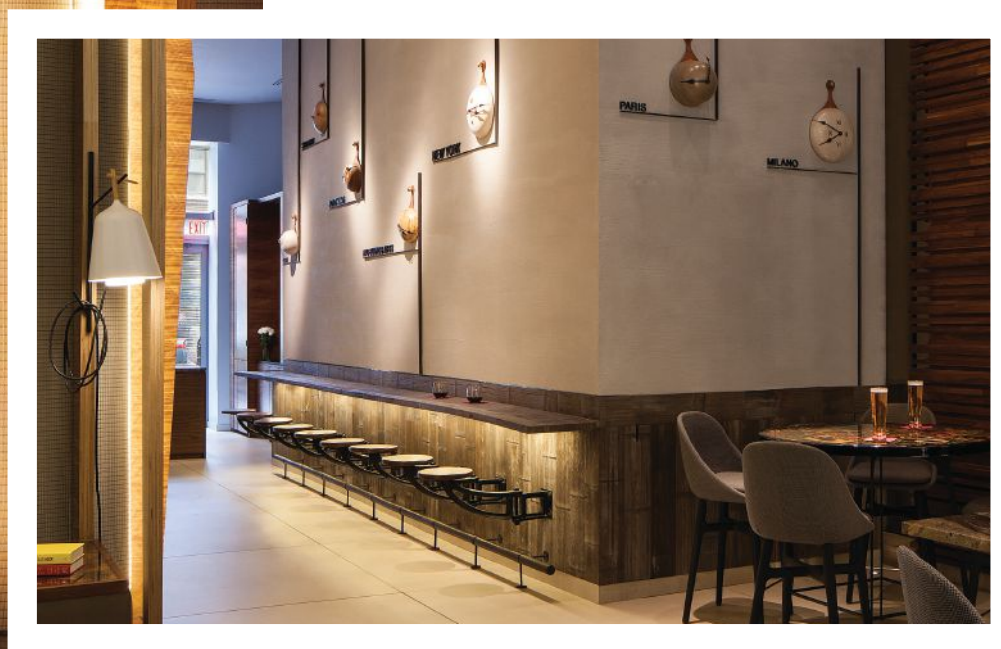
HYATT HERALD SQUARE LOBBY,

New York

text by Timothy Schuler

photos by Peter Kubilus

For the renovation of the Hyatt Herald Square lobby, PHT Lighting Design has deftly created the illusion of daylight with little more than glass block and tunable white LEDs. The reception desk and lounge was severed from the daylight-filled entrance by an 18-foot-wide elevator core in the middle of the lobby's 32-foot-wide floor plate. To stitch the two spaces back together, PHT founder Peiheng Tsai designed a custom clerestory light box that wraps around the perimeter of the lounge and gives hotel guests the impression of natural light. Built out of 4-inch-thick industrial glass block and uplit with dynamic white LEDs, the system transitions from 5000K during the day to 3500K at dusk and then to 2700K at night. Thanks to an astronomical clock, the clerestory "windows" even respond to seasonal changes in the times of sunrise and sunset. • [Read more at bit.ly/AL_HHSL](http://bit.ly/AL_HHSL)





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VoksLyte	46	www.VoksLyte.com	
WAC Lighting	C3	wacighting.com	
Zumtobel Lighting Inc.	7	zumtobel.us/panos	

CALL FOR SUBMISSIONS

ARCHITECTURAL LIGHTING invites you to forward new product releases for editorial consideration in our **Annual Product Issue** (May/June 2017), which is distributed at Lightfair. Luminaires, light sources, and lighting products that have been released after June 2016, qualify for editorial consideration. **This annual special issue showcases more than 150 lighting products in a variety of categories.**

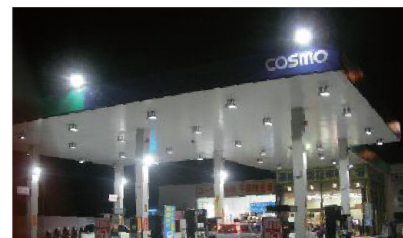
For categories, submission instructions, and to submit products go to: alproductcall.com

Please address all inquiries to:

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Washington DC 20005-5811
Email: edonoff@hanleywood.com
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SUBMISSIONS CANNOT BE ACCEPTED VIA EMAIL.

hanleywood



Compact Flood Light

Model: GY380TG/FG, GY300TG/FG
Power: 80/120/140/200W
Luminous Efficiency: 110lm/W
Beam Angle: 30°/60°/80°/110°
Color Temperature: 3000K/4000K/5000K



Highlights:

1. High Luminous Efficiency: 110lm/w.
2. Multiple options of beam angle to meet different application requirement: 30°, 60°, 80°, 110°.
3. With large illuminating surface, glare can be reduced effectively.
4. External power supply (IP67), dimming function and light control system can be added.
5. Low weight for easy mounting and maintenance, 120w only 5.3kgs, 200w only 7.5kgs
6. Adjustable U type bracket is easily for positioning and mounting.

Applications:

Billboard, Building, Workshop, Warehouse, Train Station, Airport.



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GYLED provides OEM services with the support of its professional R&D and technical departments.

ANN KALE

“What’s exciting about being a designer is meeting challenges in a creative way.”



A native Californian, Ann Kale cut her lighting teeth in New York as one of the early participants in the IALD Internship Program with Wheel Gertzoff Associates. She later worked for Jerry Kugler Associates. In 1988, she opened her own office in New York City—Ann Kale Associates, which, in 2003, relocated to Santa Barbara, Calif. While she notes that the “competition and pace of New York was exhilarating and perhaps unequalled” California offers a different way of working—one that offers greater work-life balance and the time to explore new creative opportunities.

What specific skill set does a lighting designer bring to a project?

The ability to understand what an architect or interior designer is trying to create and then add to their vision with illumination. Lighting is what breathes life into a space.

What excites you about LEDs?

We now have this tremendously efficient source and it still allows us to create dynamic lighting designs and meet the energy code.

What doesn’t excite you about LEDs?

LEDs are a very complicated light source. That translates into a greater amount of time to write a spec, time designers are not necessarily compensated for.

What is one change you’d like to see?

Lighting manufacturers need to start producing price sheets for line-item pricing. Furniture

manufacturers do, as do almost all building material suppliers. It’s a more transparent way of doing business and it doesn’t put pressure on designers to defend a design after the fact because somewhere along the way the lighting equipment has been marked up too much.

Do you still feel like you have the flexibility to design, even in California, which has some of the strictest energy codes?

Absolutely. Energy codes have made me a better designer ... forced me to use my eraser as much as my pencil. People oftentimes underestimate how powerful erasers are.

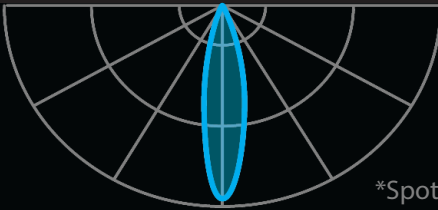
You wish the lighting community would take a stand on ...

Architectural publications not listing lighting designers in the project credits. That is a great disservice to their membership and [misleads] people about who did the lighting. •

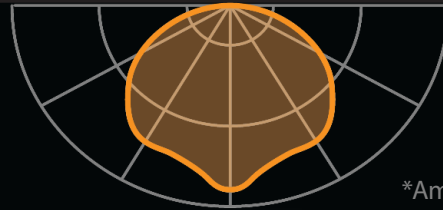
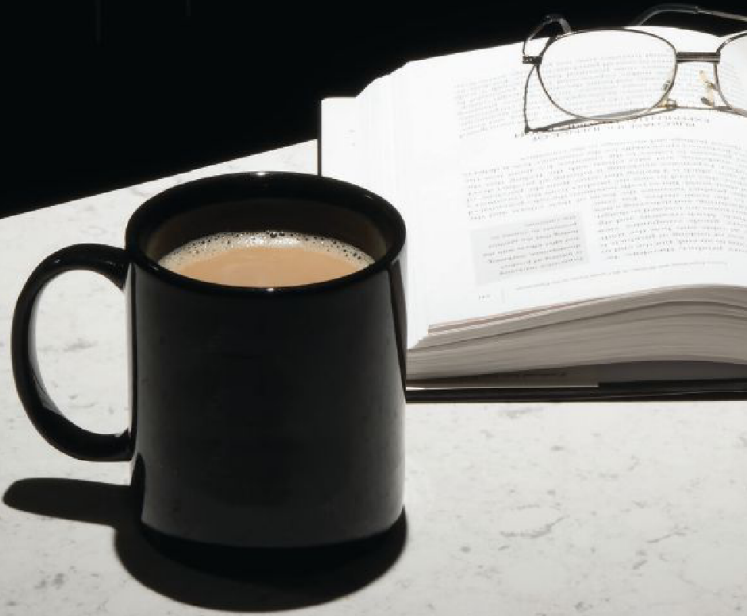
interview by Elizabeth Donoff
photo by Scott London

WAC LIGHTING

Set the right atmosphere, NATURALLY.



*Spot light distribution
High brightness
Crisp white light



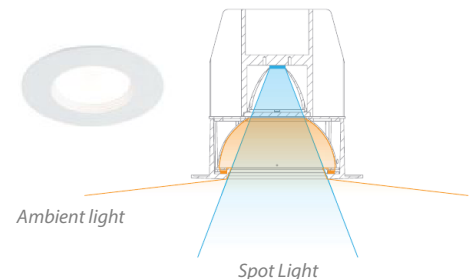
*Ambient light distribution
Lower brightness
Warm white light



Introducing our Duo LED Downlight

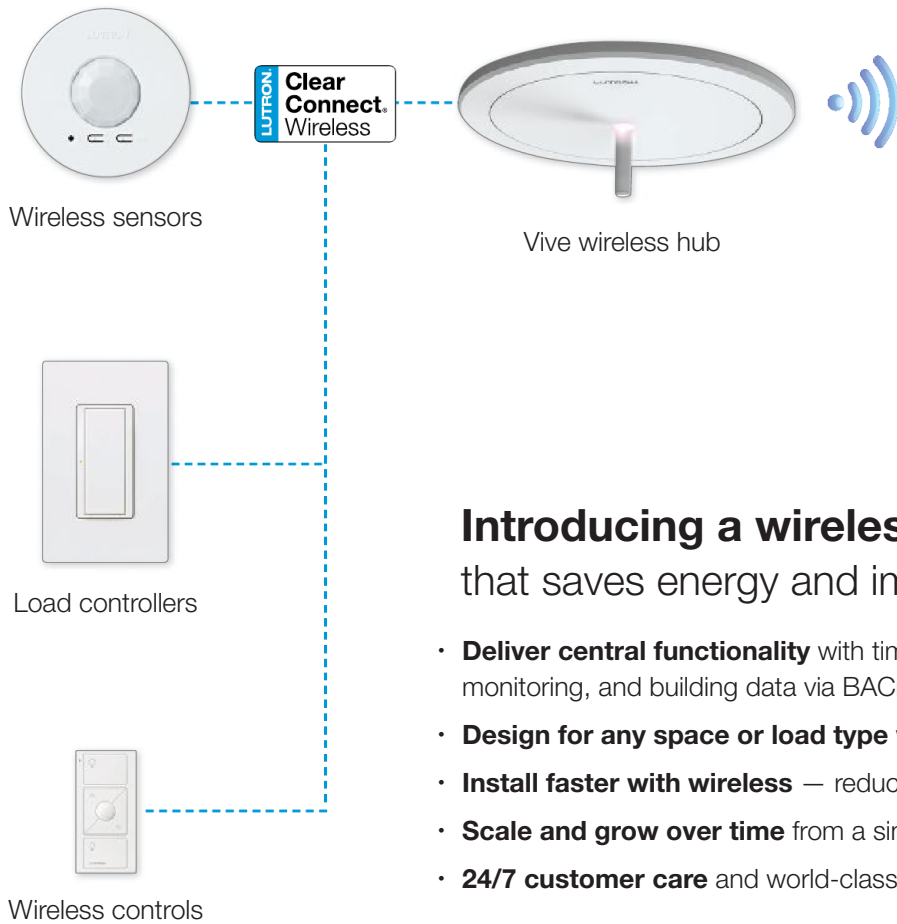
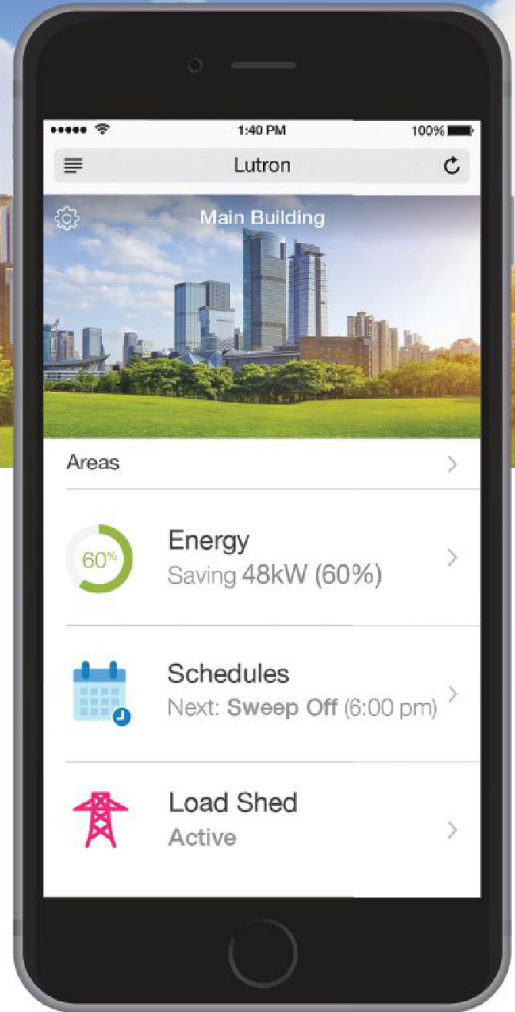
Change activity, change the lighting. Our Duo Downlight responds; changing from Bright to Dim, Crisp White to Warm White, and Direct Spot to Indirect Ambient, all in one natural motion when adjusting the wall dimmer.

**Control with a recommended Lutron Maestro MAELV-600 dimmer. For more information see www.waclighting.com/duo*



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lighting control

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