hanley wood

AL
architectural lighting

DYNAMIC LIGHT

How Projects Incorporate Daylighting Strategies

* LIGHT AND HEALTH REPORT

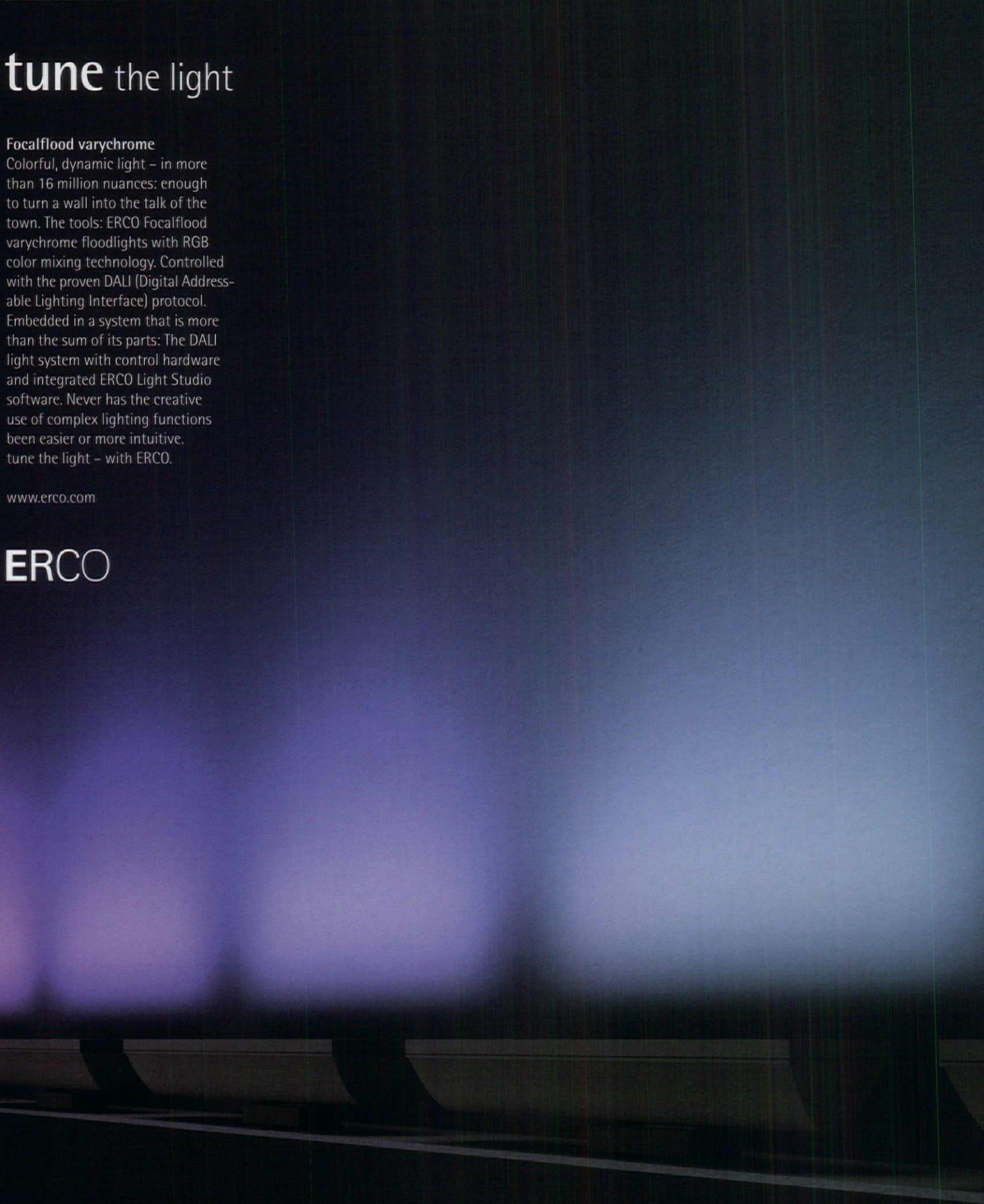
* LAMPS, BALLASTS, AND CONTROLS UPDATE

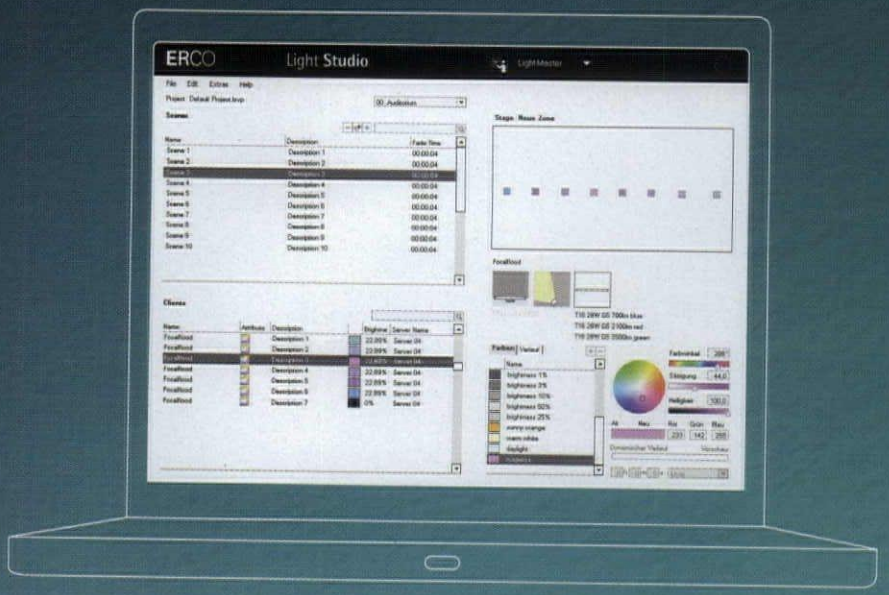
tune the light

Focalflood varychrome
Colorful, dynamic light – in more than 16 million nuances: enough to turn a wall into the talk of the town. The tools: ERCO Focalflood varychrome floodlights with RGB color mixing technology. Controlled with the proven DALI (Digital Addressable Lighting Interface) protocol. Embedded in a system that is more than the sum of its parts: The DALI light system with control hardware and integrated ERCO Light Studio software. Never has the creative use of complex lighting functions been easier or more intuitive.
tune the light – with ERCO.

www.erco.com

ERCO



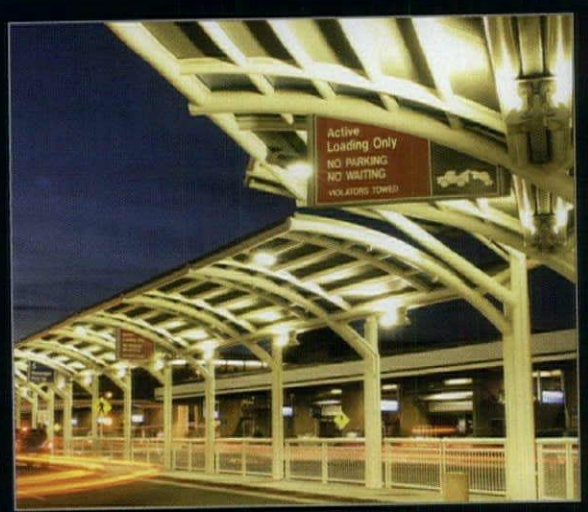


If you don't think "**Hubbell**" and "green" in the same sentence, think again…

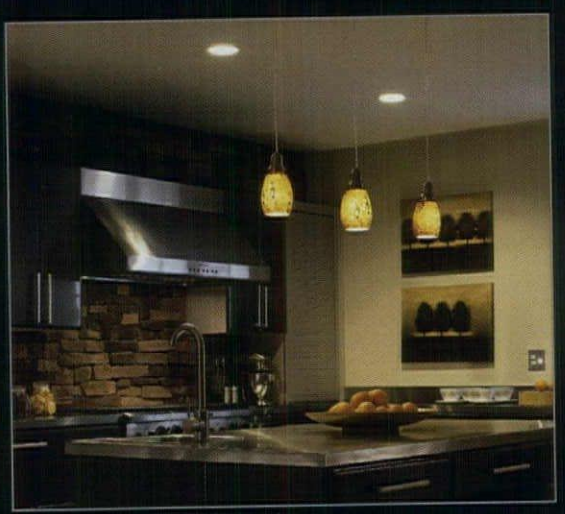
and again…

and again.

For some, green is simply a label. For Hubbell, it's much more – 175,000 square feet to be exact, dedicated to developing forward-thinking lighting solutions that will help business grow. Our new LEED Certified Lighting Solutions Center – fittingly located in Greenville, SC – brings together once disparate resources to focus on innovations in energy-efficient lighting as never before. It's a commitment that even extends beyond fixtures, to advanced H-MOSS® occupancy sensors and facility-wide LX Networked Lighting Control Systems. Enabling you to create green designs with familiar brands like Alera, Architectural Area Lighting, Columbia Lighting, Cornerstone Life Safety, Devine Lighting, Dual-Lite, Hubbell, Kurt Versen, Kim Lighting, Moldcast, Prescolite, Progress, Security, Sportsliter Solutions, Spaulding, Sterner and Whiteway. They're all under one roof now. So when it comes to helping you help your customers, and our planet, the sky's the limit – with Hubbell.



AAL fixtures like Cypher Floodlights shown here are built in the lighting industry's first carbon-neutral plant – in La Mirada, CA.



Hubbell Lighting is a world leader in LED fixtures, combining form with energy-saving function in an unsurpassed offering of downlights, undercabinet and pendant lighting.

HUBBELL®

Circle no. 59 or http://archlighting.com/productinfo

Hubbell • www.hubbell.com/thinkagain

Hubbell Lighting Solutions Center
Greenville, South Carolina

photo by Brian Dressler

Design with light.

WindowManagement® solutions:

SolarTrac® computer-automated window-shading system.

EcoVeil® sustainable PVC-free solar shadecloth.

Mecho®/5 solar shading system, recipient of the Cradle to Cradle™ Silver Certification from MBDC.

Including a full range of innovative solutions.

MechoShade Systems
The Architect's Choice™

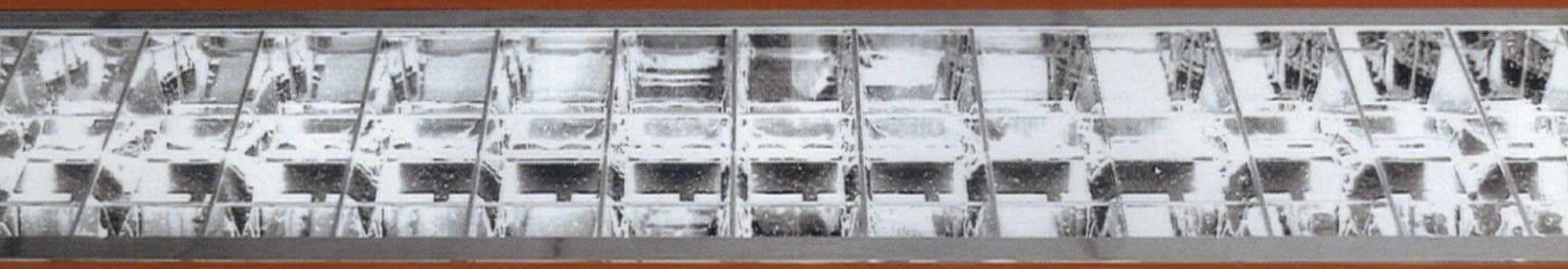
Tel: 718-729-2020 / Toll Free: 800-437-6360
Fax: 718-729-2941 / www.mechoshade.com

Mock-up, The New York Times Building, College Point, Queens, N.Y. Architecture: Renzo Piano Building Workshop with FXFowle Partners; Architectural interiors: Gensler. Photography: Jim Roof Creative, Inc.

MBDC GreenSpec®

Circle no. 78 or http://archlighting.com/productinfo

It's a GREEN light ...



no matter what color it is.

task and ambient lighting from a single source ... **as low as 0.6 w/sf.**

- works with daylight response and load shedding networks
- personal dimming control
- comfortable ... affordable

Circle no. 29 or http://archlighting.com/productinfo

TAMBIENT

www.tambient.com

AL architectural lighting

MARCH | 08

VOL 22 | NO 2

start

with a successful conclusion*

Begin each project with MIRO® by ALANOD®, the world leader in reflective surfaces. ALANOD offers a complete line of MIRO, so designers can create just the right optics for every lighting situation. Assure yourself success right from the start with MIRO.

MIRO®

Begin with MIRO® when you want the industry standard for excellence in your lighting applications. MIRO is ideal for use in fluorescent and office lighting. Never accept less than the original.

MIRO-SILVER®

Launch your project with MIRO-SILVER® 98%TR, the most reflective lighting surface ever, for applications with multiple reflections. MIRO-SILVER is just right for minimized cross section louvers, light-pipes, TFT-LCD technology and many other advanced lighting systems.

MIRO-MICRO MATT™

Start with MIRO-MICRO MATT™ for a white appearance and superior performance. MIRO-MICRO MATT is specular – it controls light direction – producing up to 20% more light to the task than the same luminaire using a white paint reflector.

Project: JP Morgan Chicago
System: TRILUX BLUEmotion, powered by ALANOD MIRO-SILVER® in TRILUX UXP-technology

*Begin with MIRO. End with success.

Circle no. 83 or
http://archlighting.com/productinfo

US East: Larrry Bloch (718) 321-0002
US West: Andy Sabel (208) 726-3003
Canada: Nancy Dow (905) 840-6868
For a white paper on any MIRO surface, visit www.alanod.com

BEGIN WITH MIRO

A|L architectural lighting

MARCH | 08
VOL 22 | NO 2

WWW.ARCHLIGHTING.COM

hanley▲wood

One Thomas Circle, N.W. Suite 600 Washington, DC 20005

A|L architectural lighting (Vol. 22, No. 2 USPS 000-846, ISSN 0894-0436) is published seven times per year (bimonthly, except monthly in March and June) by Hanley Wood, LLC, One Thomas Circle, N.W., Suite 600, Washington, DC 20005. Periodicals postage paid at Washington, DC and additional mailing offices. Printed in the USA. POSTMASTER: Send changes of address to Architectural Lighting, PO Box 3580, Northbrook, IL 60065.

Canada Post Publications Mail Agreement No. 40031729. Return undeliverable Canadian addresses to: Deutsche Post Global Mail, 4960-2 Walker Road, Windsor ON N9A 6J3.

Distributed free of charge to individuals or firms engaged in the specification of lighting products in the US. Per year, all other US subscriptions $48; Canada, $60; foreign, $96. Payable in US dollars. For subscription inquiries, address changes, and single copy sales ($8.95 in the US, $8.95 + postage outside the US, payable in advance) write to Architectural Lighting, PO Box 3580, Northbrook, IL 60065 or call 847-291-5221 or toll-free 888-269-8410.

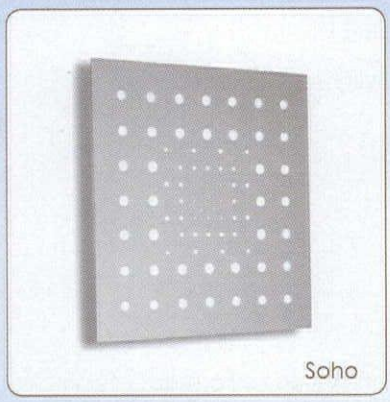
BPA WORLDWIDE

sedap

north america

www.sedap-na.com

HOSPITALITY • INSTITUTIONAL • COMMERCIAL



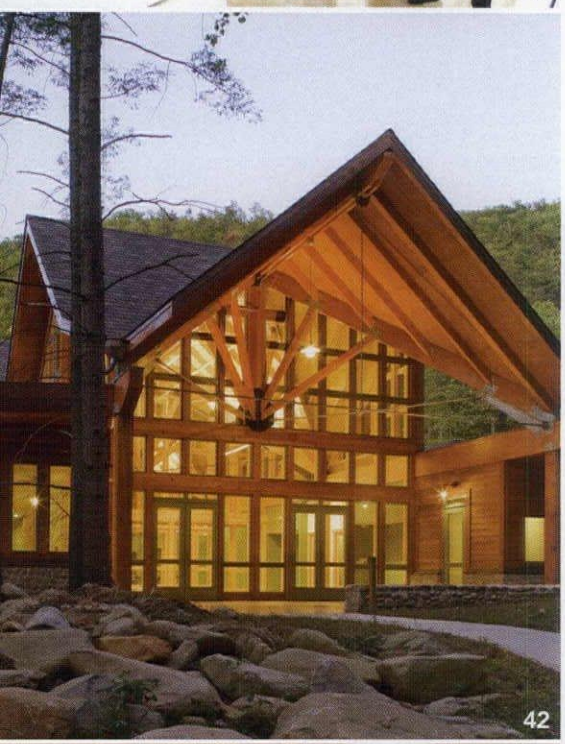
Soho

Tribeca

INNOVATIVE DESIGN FOR TODAY'S LIGHTING CHALLENGES

Circle no. 22 or http://archlighting.com/productinfo

AL
architectural lighting



industry

projects

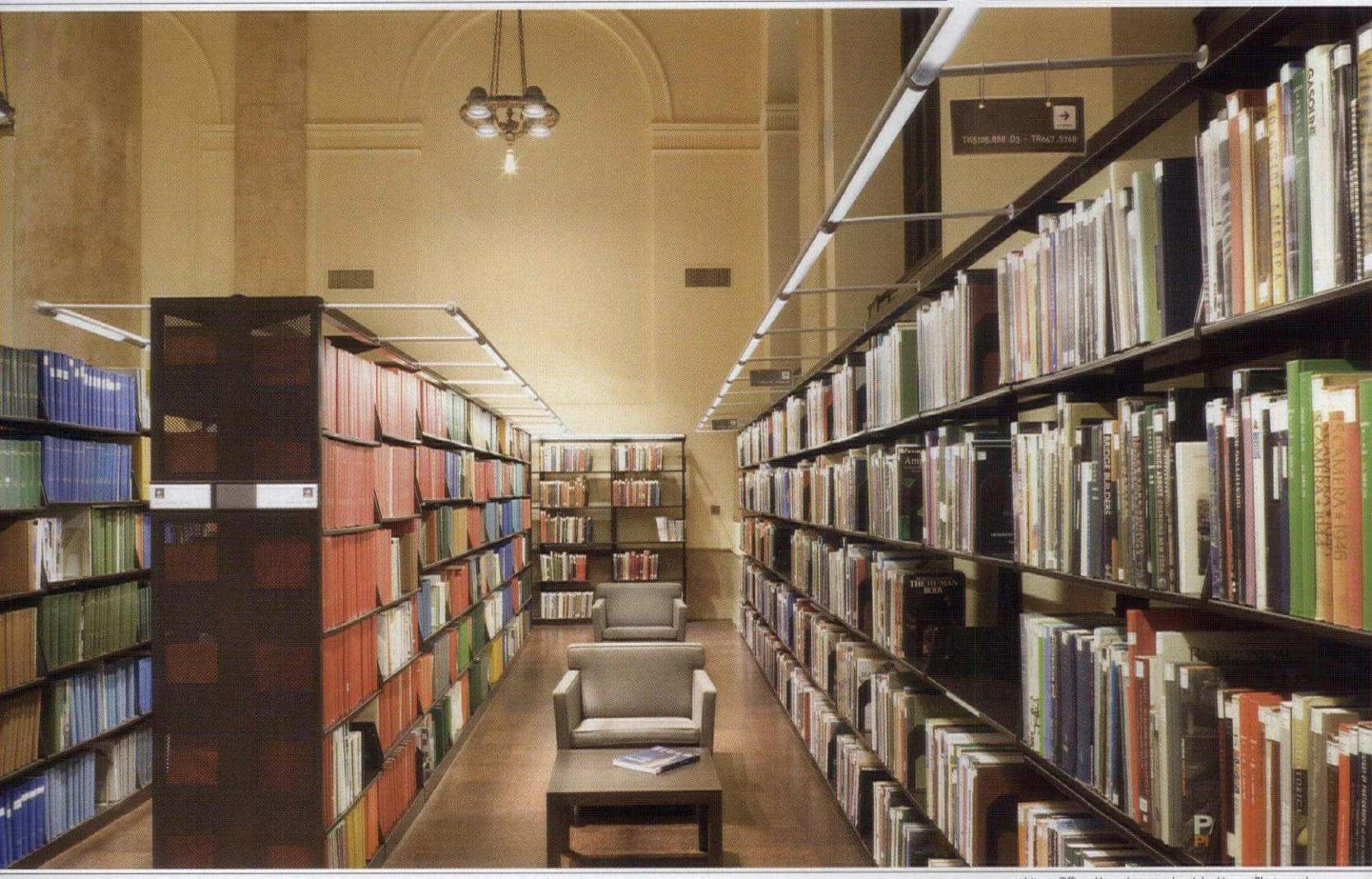
FOCUS: SINGLE-STORY RETAIL

details

Cover: A detail of the translucent stretched-fabric panels that diffuse light while bordering the ceiling perimeter of the ballroom at the H.Roe Bartle Hall, Kansas City Convention Center, Kansas City, Missouri.
PHOTOGRAPHER MICHAEL SPILLERS, KANSAS CITY, MISSOURI

This page: Velux Daylighting Symposium, May 2007, Bilbao, Spain; the entrance to the Twin Creeks Science and Education Center, Great Smoky Mountains National Park, Tennessee; the produce section of the Puget Consumer Cooperative Natural Market in Redmond, Washington.

ENVISION **LIGHT**



architect: Office dA photography: John Horner Photography

EXPERIENCE **BARTCO LIGHTING.**

retail / commercial / institutional / hospitality / residential

bartco LIGHTING
leading the way and lighting it.™

visit RëLEDSYSTEMS, a division of Bartco Lighting, at **GLOBALSHOP** booth#3254
Circle no. 21 or http://archlighting.com/productinfo

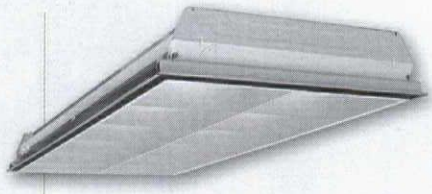
manufacturers of quality lighting products

tel **714.230.3200** fax **714.230.3222** / bartcoLIGHTING.com

COLUMBIA LIGHTING ENERGY SOLUTIONS

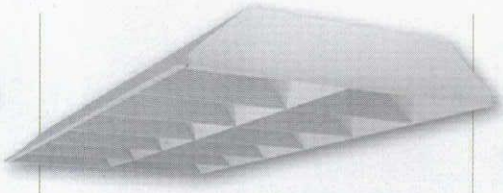
createchange

LESS ENERGY
WITHOUT SACRIFICING LIGHT LEVELS



EnergyMax™ Parabolic

TUNED
The EnergyMax™ Parabolic tuned system produces an amazing 89% efficient luminaire that provides the same lumens as a traditional three-lamp parabolic while using only two lamps.



EnergyMax™ Intersect

CRISP
EnergyMax™ Intersect is a two-lamp louvered luminaire designed to provide full distribution and energy savings in a crisp new look. The tuned ballast provides perfect balance between light output and energy use.

VersaBay™ High Bay

COOL
VersaBay's Advanced Thermal Management decreases ballast temperatures in unconditioned spaces. Our innovative heat dissipation system with a 5-year warranty at 65°C helps reduce energy costs up to 50%.

Along with these energy-efficient products, Columbia Lighting now offers resources including an informative brochure on EPAct, the Payback Machine Calculator, and other tools to help you get up to speed.

It's easy. Join us at **create-change.com**.

HUBBELL
HUBBELL LIGHTING, INC.

Columbia LIGHTING
www.create-change.com

Circle no. 39 or http://archlighting.com/productinfo

PHOTO BY SPENCER LUM

The Future Looks Bright

AS WE ASSEMBLED THE CONTENT for this issue on daylighting, I have not been able to get the image of the Pantheon in Rome out of my head. Just say the word "daylighting" and my mind automatically leaps to that iconic interior image of the temple's coffered ceiling and oculus with a shaft of light streaming down into the center of the space. While it might be a bit much to expect that every daylighting project have the heroic attributes of a space like the Pantheon, I do think it is reasonable to expect today's architectural lighting design projects to seriously consider their relationship to light, no matter the project typology.

Daylighting as a lighting strategy is not simple—it is far more than a space with windows and shades. We have organized this edition of *Architectural Lighting* to touch on issues and projects that represent a range of thinking about daylighting—from advanced technical systems to core building principles of site and aperture. As my own thinking on the subject has evolved, I have come to the conclusion that daylighting affords us the opportunity to pause and re-examine the very essence of the society we have become—a 24/7 culture where technology allows us to control our environments independently of time of day or season. In mankind's evolution from an agrarian-based society to a post-industrial one, have we lost a basic connection to and understanding of light? I think so.

There is no doubt in my mind that I would prefer to be in a sunny space, and this feeling has been reinforced by the fact that I work in a windowless office with an indirect/direct luminaire fitted with an aluminum cross baffle and three T5 4100K fluorescent lamps. (How ironic that the editor of lighting magazine works in such conditions! I can only wonder what long-term effect this will have on my health and vitamin D levels.) Did the interior designer or space planner who laid out this room give any consideration to what it would be like to work in this space? I doubt it, as their principal focus probably was centered on fitting in the mandatory office furnishings.

Daylighting, as it turns out, just might be the most important lighting discussion of today. It always has been part of this magazine's focus. In A|L's first, issue two articles—"Daylighting Can Improve the Quality of Light—and Save Energy" and "Lighting Control Technology Grows in Importance"—very well could have been the titles of articles in the present volume. What have we learned in 22 years? I believe we must demand the creation of quality environments to reclaim a connection to the world around us. We cannot continue to live in the hermetically sealed environments of our homes and offices. It already has modified our behavior patterns (i.e. less sleep, less exposure to sunlight) and will continue to do so if we do not move daylighting topics to the forefront of our design discussions.

To that end, I am particularly excited to see such an impressive lineup of seminar offerings at this year's Lightfair Daylighting Institute. Although Lightfair generally is not a stop on the architecture community's conference agenda, I would urge the architectural readership of A|L to reconsider a visit this May to Las Vegas to hear and learn about daylighting firsthand, from some of the most well-respected and knowledgeable daylighting practitioners today. And for the first time, in my estimation, at the American Institute of Architects National Convention in Boston, two pre-convention seminars will be given by lighting practitioners and make heading to the conference a day early completely worthwhile—Robert Osten Jr. and Keith Yancey's "Taking Back the Sun: The Architect's Role in Daylighting Design," and Edward Bartholomew, Joel Loveland, and Christopher Meek's "Integrated Lighting Design for High-Performance Buildings."

ELIZABETH DONOFF
EDITOR

APRIL/MAY 2008 EXCHANGE QUESTION

How will the upswing of mergers and acquisitions among lighting manufacturers change the industry landscape? What impact will it have on research and development of new products and technologies? And how will it impact the specification and distribution process?

To be considered for print, responses are requested by March 24, 2008.

SEND RESPONSES TO EDONOFF@HANLEYWOOD.COM

T4 & T6 CMH
Optica Track
Fixture

ADJUSTABLE BEAM, MEET SUSTAINABLE ENERGY.

ECO TECHNOLOGY
Sustainable Energy Solutions

INTRODUCING THE ALL-IN-ONE, SPOT TO FLOOD, ECO-TECHNOLOGY CERAMIC METAL HALIDE FIXTURE. ONLY FROM CON-TECH.

INSTANTLY CHANGE THE BEAM DISTRIBUTION FROM SPOT TO NARROW FLOOD TO FLOOD WITH ITS COOL-TO-THE-TOUCH ADJUSTMENT KNOB. HIGH PERFORMANCE OPTICS PROVIDE MAXIMUM PERFORMANCE AT EACH BEAM DISTRIBUTION AND LOCKABLE PRECISION AIMING WITH 360° HORIZONTAL AND 180° VERTICAL ROTATION OFFERS VERSATILITY IN THE FIELD. IT'S WHY CON-TECH MAKES IT BETTER.

RECESSED | TRACK | RAIL | DECORATIVE GLASS | SCONCES | EMERGENCY

800-728-0312
CON-TECHLIGHTING.COM

CON-TECH LIGHTING® makes it better.

LIGHTFAIR
BOOTH 627

Circle no. 24 or http://archlighting.com/productinfo

VELUX DAYLIGHTING INITIATIVES

Informal breakout sessions at the Velux Daylighting Symposium in Bilbao, Spain, allowed conference attendees to interact one-on-one with presenters and peers (above).

PHOTO COURTESY OF VELUX

IT IS NOT UNCOMMON FOR BUILDING MANUFACTURERS TO LAUNCH initiatives that promote their companies and their products. However, Velux, a Dutch company with a global reach, founded in 1941 and best known for their product offerings of roof windows and skylights, has redefined this paradigm to look more broadly at issues impacting architecture and design. Focusing exclusively on the topic of daylighting, the company's three major programs—the International Velux Award for Students of Architecture "Lights of Tomorrow" (see "Lighting Competitions, Scholarships, and Grants," *Architectural Lighting*, Nov/Dec 2007, p.29); the Velux Daylight Symposium; and a publication entitled *Daylight & Architecture* Magazine—are making significant contributions to an expanded design dialogue.

The Velux Daylight Symposium has been held twice to date—in 2005 in Budapest and in May 2007 in Bilbao, Spain. With the goal of 'creating an international platform for exchange of knowledge, viewpoints, and vision,' the two-day conference brought together approximately 500 architects and lighting designers from around the globe. Discussion in Budapest centered on the need 'for a common language about daylight' and 'how to define or perceive daylight quality in buildings.' The Bilbao event continued the dialogue, focusing on two important aspects of daylight, one, the impact of daylight in schools and the relationship between daylighting and student's performance, and two, the tools necessary to teach students and practitioners daylighting techniques.

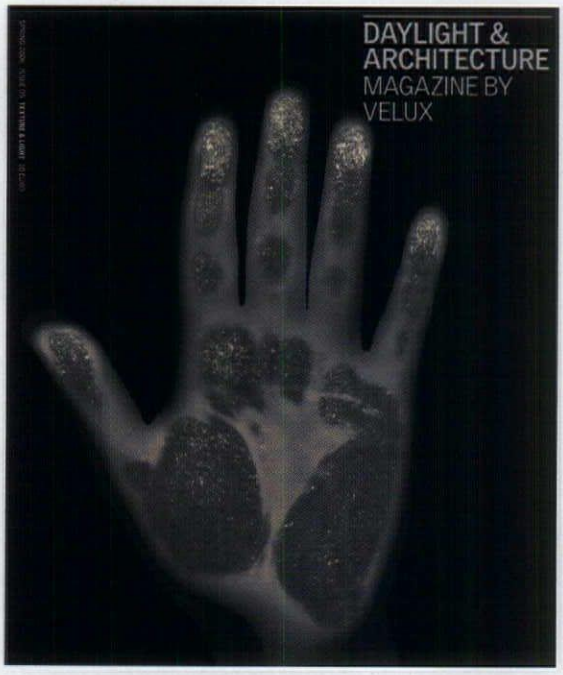
Moderated by lighting designer James R. Benya, principal of Oregon-based Benya Lighting Design, and architect Jan Ejhed, director of the lighting program at KTH, Royal Institute of Technology in Sweden, the symposium included formal paper presentations and informal breakout sessions where conference attendees could interact one-on-one with presenters and peers.

Notable speakers included Lisa Heschong, who presented her firm's work on "Daylight and Student Performance." For more than three decades, Heschong, principal of Fair Oaks, California-based Heschong Mahone Group, has studied the effect of spatial conditions and classroom characteristics—room size, orientation, and access to daylight—on student performance.

Also attending the conference was lecturer Richard Hobday who discussed "Health, Architecture, and the Sun." Using historical architectural precedent coupled with current medical research Hobday argues that sunlit spaces are an absolute necessity, otherwise conditions such as vitamin D deficiency will continue to increase at an alarming rate.

As the symposium confirmed, the interest in and desire to work toward a more informed understanding of daylight and its impact on humans and the environment continues to grow. In fact it must, if designers are to meet the challenges of today's building issues. As Benya remarked in his opening comment, "Beyond good design practice, it is perhaps time to demand dayligted environments through codes and standards that make well-daylighted buildings the rule, rather than the exception." Full conference proceedings are available at www.thedaylightsite.com. **ELIZABETH DONOFF**

DAYLIGHT & ARCHITECTURE



ANOTHER OF VELUX'S INITIATIVES ON THE SUBJECT OF DAYLIGHTING IS THE PUBLICATION TITLED *Daylight & Architecture*. developed at the corporate level, the magazine is distributed to architects and designers in 34 countries.

With seven issues to date, according to Christine Bjørnager, a member of the publication's editorial team, the magazine was developed because Velux "had a wish to strengthen our relations to architects." She goes on to explain, "Velux wants to play a role by contributing and stimulating issues that lead to better living environments. To obtain this we wish to encourage the role of daylight and fresh air in design. *Daylight & Architecture* is a communication tool for Velux wanting to reach a mass audience, as a dialogue platform for a complex target group."

Each issue explores different aspects of light and architecture as it relates to daylighting through a combination of article typologies—essays on light, built projects, interviews with architects and artists, and book reviews. Recognizing the role that culture and region play in determining responses to and interaction with light, the publication looks at the subject with a global perspective. Issue themes have included: diversity, living environments, site and materials, vision and perception, form and experience. Marrying theoretical discussions with real-time projects, *Daylight & Architecture* offers a refreshing take on the topic of daylighting. The publication is available online at www.velux.com/da. **ED**

PHOTO COURTESY OF VELUX

UNPARALELLED

Prescolite has been at the forefront of LED evolution in the lighting industry since it began. This is only the beginning.

Contact your local Prescolite representative or visit www.prescolite.com/LED to learn how Prescolite's approach to LED lighting remains UNPARALELLED in the industry.

WWW.PRESCOLITE.COM/LED

Hubbell Lighting, Inc.

prescolite
ABOVE AND BEYOND

E DAYLIGHTING COLLABORATIVE ERS NEW RESOURCES

A LITTLE KNOWN BUT NONETHELESS VALUABLE RESOURCE ON the daylighting front is the Daylighting Collaborative (www.daylighting.org), established in 2000 by the Energy Center of Wisconsin (www.ecw.org) located in Madison. The Energy Center is a private, nonprofit organization established in 1989 that focuses on energy and sustainability issues. The Daylighting Collaborative's goal is to act as a definitive source of information for building designers and owners who are looking to incorporate daylighting strategies into their projects.

Directed by Abby Vogen Horn, senior project manager for the collaborative and a staff of eight at the Energy Center, the organization has both a real-time event and online presence, and is funded by grants and sponsorships, principally from utilities, government, foundations, and product manufacturers. An invited advisory committee, which presently includes lighting designer James Benya; Neall Digert, vice president of commercial market development for Solatube International; architect Bill Sturm of Northbrook, Illinois-based Serena Sturm Architects; and Eric Truelove, director of sustainable design at The Renschler Company a firm specializing in high-performance building design and construction services, also provides programming input.

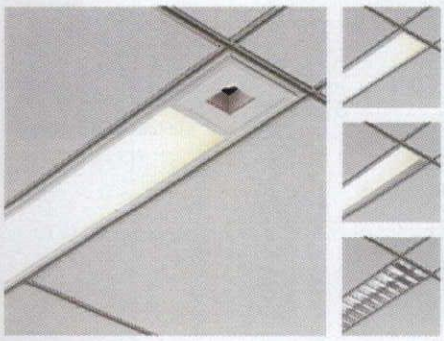
The collaborative's newly redesigned website provides a wealth of resources regardless of one's level of experience with daylighting topics. In the "What/Why" section, an overview of what is daylight and what constitutes good daylighting in a project is coupled with a discussion of the top 10 daylighting myths. The "Resources" portion of the website provides links to lighting-related websites, daylighting labs, daylighting design information basics, and a library guide of written reference materials, research studies, and project profiles. The "Tools" section supplies a comprehensive glossary of architectural and lighting terms essential to a daylighting vocabulary. The "Training" component of the site offers information about events organized by region and links to a series of online training and education resources focused on high-performance buildings, particular building types such as schools, and general daylighting subjects.

A newly established bimonthly newsletter, titled *Enlighten*, keeps readers appraised of training resources at the center and online, updates on technology and research initiatives, as well as daylighting-related news items. While all materials on the website and receipt of the e-newsletter are available free of charge, the collaborative does encourage membership, which provides complimentary registration to three online training courses offered by the Energy Center and in the future will provide access to members-only website content. With these resources, the collaborative is sure to fulfill its mission of "lighting every building using the sky." **ED**

avenue™ 6

FOCAL POINT®

THE ART OF LIGHT®



USG

Focal Point® is pleased to announce the addition of Avenue 6. Designed specifically for Logix by USG, the Avenue 6 series is also compatible with other 6" specialty ceiling systems. This new series offers 1 or 2 lamp T5/T5HO fluorescent with multiple shielding options. Avenue 6 + ID™ integrates our popular square ID MR16 product with all its features and benefits.

Revit® files for Avenue 6 are available for free download at focalpointlights.com as well as usgdesignstudio.com.

Revit content by CADworks.

cadworks

LIGHTFAIR INTERNATIONAL

BOOTH 2367

Circle no. 49 or
http://archlighting.com/productinfo

SQUARE PEG, ROUND HOLE A LETTER TO THE EDITOR ... AND THE LIGHTING PROFESSION

I'VE ENJOYED WITNESSING THE CRITICAL DISCOURSE PUBLISHED IN A|L RECENTLY SURROUNDING THE topic of energy code restrictions and encourage more of this discursive exchange, especially surrounding topics that inevitably are shaping the future of our profession. I'm grateful that A|L is a willing platform to disseminate to our population such valuable questions.

In my opinion the recent writings, from esteemed colleagues I greatly respect, lose track of the essence that initiated energy guidelines, which is to positively impact the greater good of society. My colleagues, and the resulting articles ("Observations From Practice," p. 27 and "Design/Energy Code Debate, Sept/Oct 2007, p. 96; and "Design/Energy Code Debate...continued, Jan/Feb 2008, p. 72), instead seem to focus attention on frustrations surrounding minutia in applications within certain project typologies and navigational techniques for such policies while also harkening toward nostalgic reflection of past days where fewer restrictions seem to offer greater creative opportunity.

As the complexities of our daily working process require piecing together individual tasks associated with each project, we must remain cognoscente of the larger implications of how our work touches the world. Our profession has evolved through being task specialists; understanding the material of light and its applications better than others. As this narrow view of the task in front of us has sharpened our propensity of what we do, I offer that it has simultaneously narrowed our field of view regarding the presence of light within the entirety of a project and beyond to societal and world issues.

The reality is that the practice of lighting design has changed. Where light was once understood simply as a medium that renders architecture, light is now considered a significant medium in its own right—an essential aspect of building performance, particularly in terms of energy.

With codes bearing down on us, the lighting profession should consider itself fortunate to be in a position of leadership that has early involvement in a building's overall design, performance, and programming. Isn't this increased level of contribution and in turn professional respect from colleagues in parallel fields exactly what we've been yearning for? Rather than reminisce about past design methods that may well be outdated, why do we not embrace this moment of change? Since when is a "restriction" viewed as an evil? Should we not recognize the larger benefits of energy regulation and simply consider it as one of several "limits" to a project that we address daily (e.g., budget, maintenance, program), which have no negative implication on creative opportunity but rather enhance ingenuity?

Let's take charge of this pivotal moment in our profession's evolution to reinvent the values of light within architecture and society, scrutinize application standards, reinvent our academic programs, and embrace these "restrictions" as a new means of defining aesthetic parameters. Should we not lead the process to ensure the peg is retooled to properly fit within the parameters we define as meaningful? This retooling process requires perseverance, collective contribution, and change. **DEREK PORTER,** IALD, IESNA

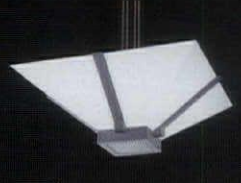
PRINCIPAL, DEREK PORTER STUDIO, KANSAS CITY, MO

DIRECTOR, MFA LIGHTING DESIGN PROGRAM, PARSONS THE NEW SCHOOL FOR DESIGN, NEW YORK CITY

The Reef Atlantis
Paradise Island, Bahamas
Lighting Designer: Lighting Design Alliance
Photographer: George Gruel, Oddstick Studio

RSA™ Combolight Gen 2

IRiS® Squares



Shaper™ "Craftsman-Styled" Pendants

Portfolio™ Downlights

Lighting brings architecture to life.

Let Cooper Lighting illuminate the details of your vision.

Innovative thinking is one of our greatest assets. Our extensive offering of unique architectural products brings limitless lighting solutions from one source.

See for yourself at www.cooperlighting.com

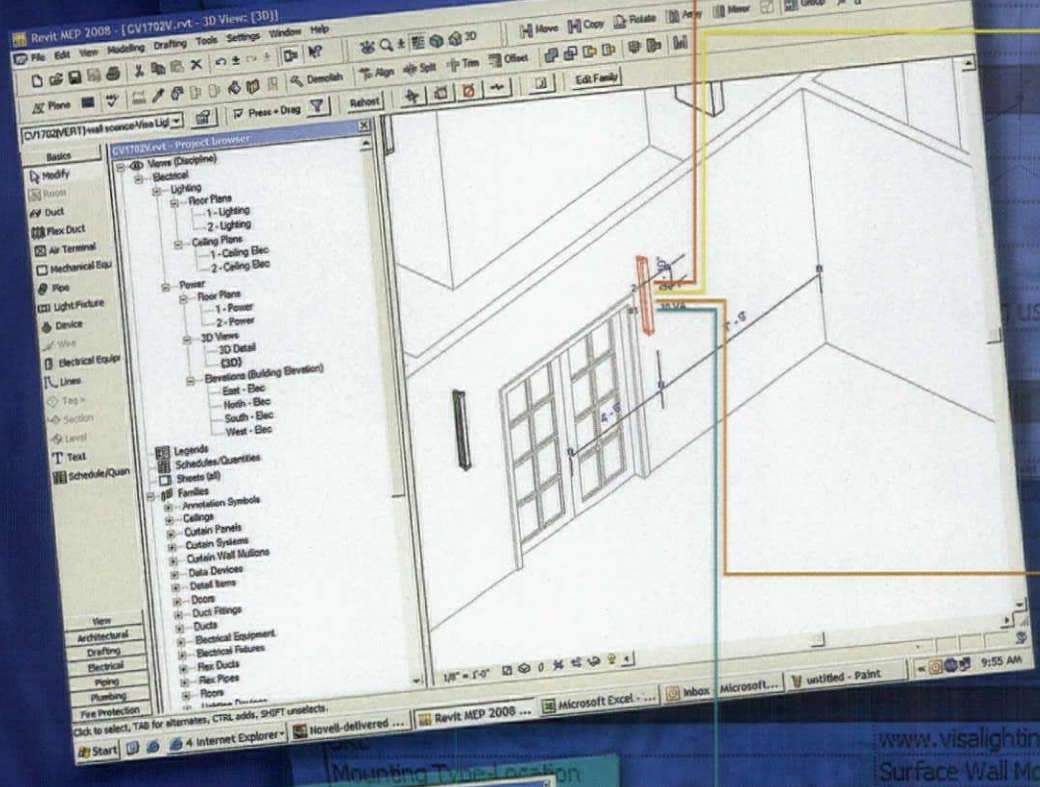
Circle no. 25 or http://archlighting.com/productinfo
www.cooperlighting.com

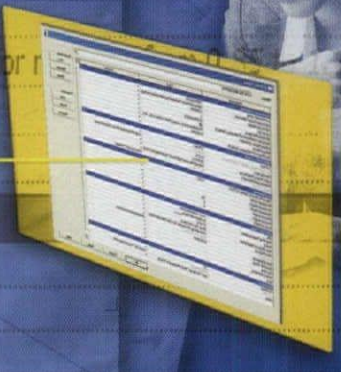
COOPER Lighting

WHAT YOU SEE
DEPENDS ON WHO YOU SPECIFY

Visa Lighting is leading the integration of **BIM** Building Information Modeling requirements through downloadable files featuring 3D models and metadata across the product line.

ENGINEERS





ESTIMATING AND ACCOUNTING

ARCHITECTS AND DESIGNERS

CONSTRUCTION MANAGERS

Information is the new dimension at www.visalighting.com.

It's a whole new way to look at Visa Lighting.

A NEW DIMENSION

2008

1-800-788-VISA

WWW.VISALIGHTING.COM

VISA LIGHTING
An Oldenburg Group Company

Circle no. 38 or http://archlighting.com/productinfo

Light and Health

LIGHT'S IMPACT ON HEALTH IS PLAYING A CENTRAL ROLE IN DESIGN.

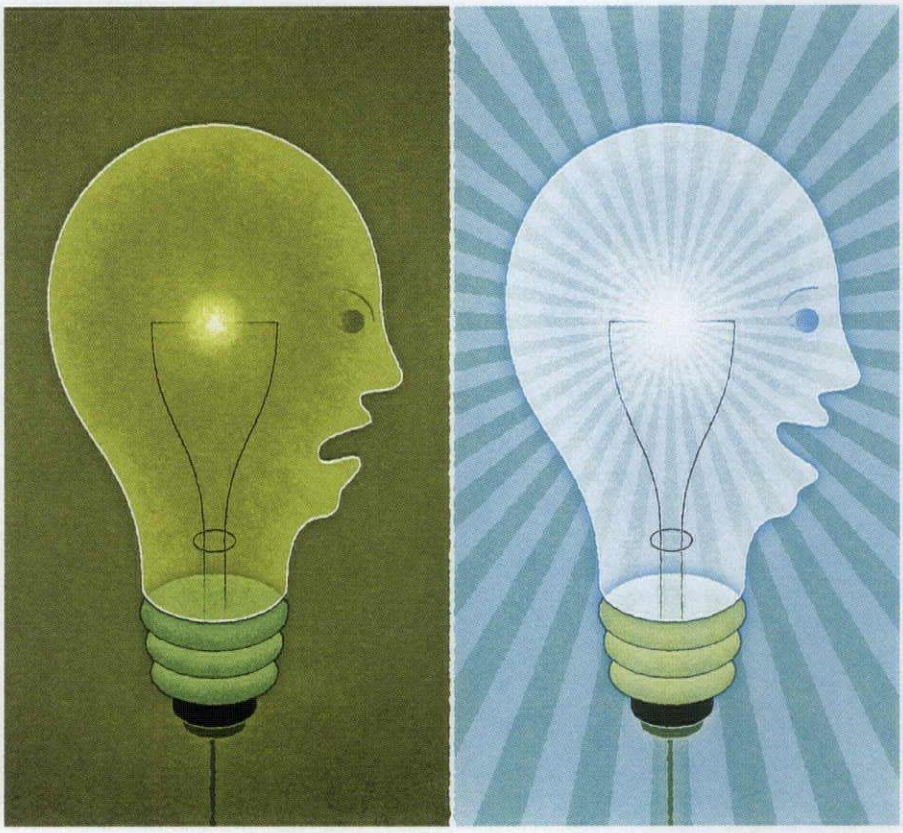


ILLUSTRATION BY MATT KENYON

ALTHOUGH THE USE OF LIGHT TO TREAT AILMENTS CAN BE TRACED back thousands of years to ancient India, Egypt, and China, it is only in the past 25 to 30 years that issues of light and health have begun to be addressed in contemporary discussions. And only in the past 10 years have modern science and medicine started to recognize light's critical impact on human biology in myriad health-related issues now indicative of our 24-hour culture.

Why, then, has the topic of light and health moved to a more prominent focus in design, science, and medical discussions? According to Dr. George Brainard of Thomas Jefferson University, Department of Neurology in Philadelphia, one of the leading researchers on the subject of light and health for the past 25 years, there are three principal reasons: the seminal discovery in 1980 that light could suppress the production of melatonin (a hormone secreted by the pineal gland and thought to be concerned with regulating the reproduction cycle); the 2001 discovery of different photoreceptors in the human eye that govern and distinguish between day vision and night vision; and the 2002 discovery of the photosensitive ganglion cells in front of the human eye's retina that indicate there are photoreceptors that work independently of the vision system and have significant impact on our endocrine system (glands that secrete hormones directly into the blood).

While these discoveries are paramount, present day issues related to lighting design also are contributing to this increased awareness. Fred Oberkircher, associate professor at the Texas Christian University Center for Lighting Education in Fort Worth, Texas, observes the increased awareness as a general societal recognition of health issues combined with the need to reduce energy use. Coupled with the discovery of the ganglion cell receptor, the dialogue begins to reach a broad spectrum of people, and no longer is relegated to a niche discussion.

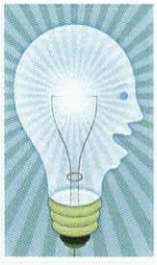
AREAS OF INVESTIGATION

There are several principal areas of investigation pertaining to light and health related issues. They include: study of the circadian cycle; sleep disorders; seasonal affective disorder, commonly referred to as SAD; eyestrain; visual performance; tissue damage to eyes and skin because of ultraviolet (UV) radiation; and vitamin D deficiency. There also are studies related to the correlation between light and specific types of cancers, although currently researchers agree there is not enough data gathered to make the findings conclusive. As Dr. Jamie Zeitzer, assistant professor of psychiatry at Stanford University and the VA Palo Alto Health Care System, points out, there are as many levels to study these topics as there are research areas, ranging from molecular DNA and cell structures to human biology and biochemistry.

GATHERING DATA—BIOLOGY OR PSYCHOLOGY?

One of the greatest obstacles facing light and

health related research has been how to distinguish between biology and psychology and prove that both are equally relevant. Zeitzer states, "If you can show something at the biological level there's more credence to it. Whenever you talk about something at the psychological level people always think of it as a more labile concept. For years physicians didn't take insomnia as a serious problem, they viewed it as a psychological phenomena rather than a physiological one. A lot of the effort in the past 20 years has been trying to quantify these issues as an actual biological process."



"We are in the early days of a revolution. Ten years ago it was an issue of if light impacts health. It's not a question anymore, it's how and when."

CIRCADIAN CYCLES

No matter the area of research, it is fair to say that all these investigations find their roots in the circadian cycle. "In less than two generations we have totally changed our relationship to the circadian rhythms of life," Oberkircher says. "We have experienced two huge changes in the last 100 years—the electric light bulb and air conditioning. The question is what does it mean when we are no longer governed by the sun coming up and the sun going down? What are the ramifications of our choosing to ignore this natural day-night cycle?"

"Every living organism on the planet—from bacteria to fish to plants to humans—has a circadian rhythm, it's a fundamental property," Zeitzer says. "But now with 24 hours of electric lighting and transcontinental travel, our biology is not set up to behave this way. We can adapt, but our bodies were not meant to do this."

The concern is long-term dehabilitation. Potential high-risk groups such as flight attendants and shift workers, particularly nurses who work the second and third shifts their entire career, are the focus of specific studies to understand light's impact on the human biological clock at odd times on an ongoing basis. Although it is possible to train our biological systems to be at "peak" performance all the time, it would come at great expense as we would neutralize our circadian systems.

RESEARCH INTO APPLICATION

At the Lighting Research Center (LRC) in Troy, New York, assistant professor Mariana Figueiro is investigating what color and type of light is more effective in coordinating with our circadian rhythms. "We want to understand light's impact on alertness at different times of day and how the retina converts light signals," she explains. In 2007, the LRC received a $1.8 million grant from the National Institutes of Health (NIH) to develop a light meter that measures the 24-hour circadian light-dark cycle. According to a press release from the LRC, the wireless device, called a daysimeter, has "the capacity to communicate with the user in real-time to give immediate feedback regarding proper light exposure to promote a synchronized circadian rhythm." The goal, according to Figueiro, is to convert these light-dark patterns into protocols that can be used in animal studies to enable researchers to start exploring certain diseases such as diabetes and obesity.

DESIGN IMPACTS

The challenge then becomes how to translate research into applications. To date, the design of healthcare facilities has received great attention, to the point where hospital designs now incorporate more natural light into patient areas than before. Oberkircher points out that the dynamic quality of daylight as it changes in intensity, angle, and color often is forgotten by designers when considering light sources in a space. "We need to be more aware of the dynamics of the lighted environment," he states.

Time is another factor to be considered. "Specifiers don't think about this when they are designing," Figueiro says. "As researchers, we have to develop better strategies for disseminating this information to architects and lighting designers so they understand the link between luminaire type and color temperature and the effect that has over the course of a 24-hour cycle." She notes that controls will play a big role in meeting the needs of both the circadian and the visual system.

Still, there are obstacles. The two principal communities involved in the discussion—designers and scientists—do not speak the same language. Figueiro also believes there is the need for a "mentality change" among members of the design community for them to take this information seriously and start applying it to real-time scenarios and spaces. "You have to expand the discussion to architects and that hasn't happened yet. I think this topic is completely foreign to architectural designers." Yet in Oberkircher's opinion, there is "a wonderful synergy between fields that have worked independently for too long."

SPACE AND BEYOND

Funding sources are growing scarcer. In the past eight years the current administration has substantially eliminated the bulk of science and medical research funding at the NIH, the nation's premier research institution. Researchers studying light and health, in turn, have had to become more creative in how they seek financial support looking beyond traditional outlets, for example, through two of the NIH's branches, the National Institute of Mental Health and the National Institute on Aging. And as researchers begin to investigate potential links between light and certain types of cancer, the National Cancer Institute has become another funding resource. As Zeitzer explains, "If you are doing basic research and you can hook onto a specific disease already under investigation, it will be a lot easier to receive funding for your particular area of research."

NASA also has been a great source of support for light and health research. As the space program continues to send humans into space, it is critical for NASA to understand how space travel impacts the circadian cycle. According to Brainard, who works extensively with NASA, studies already have shown that space flight disrupts the human circadian cycle. In fact, astronauts suffer from chronic partial sleep deprivation and even with sleep medications can only obtain 4-1/2 to 6 hours of sleep while in space.

The National Space Biomedical Research Institute, a branch of NASA, also actively is involved in exploring leading-edge technology. With the potential of one day colonizing the moon and Mars, architecture suitable for these environments will be necessary, in addition to lighting systems that can respond to the lighting conditions of these other planets. How would the human body adapt to these different light levels and what steps would be required to sync the human circadian cycle with these other planetary systems? As Brainard says, "We are in the early days of a revolution. Ten years ago it was an issue of if light impacts health. It's not a question anymore, it's how and when." **ELIZABETH DONOFF**

ILLUSTRATION BY MATT KENYON

LIGHTOLIER

Performance.

Style.

Innovation.

Available in the following Energy Smart configurations.

20W CMH	22W CMH	39W /70W CMH
MR16 GX10 (TAL)	BT5 (PGJ5)	T6 Bi-Pin
T4 GU6.5 (TAL)		PAR30
PAR30		

Alcyon HID represents the state of the art in Ceramic Metal Halide track lighting for retail, commercial and architectural applications. Employing the latest in miniature lamp and electronic ballast technology Alcyon HID delivers the highest performance accent and flood lighting in a stunning wireless design.

- Integral horizontal & vertical locking
- Captive snoot accepts two accessories
- Lamp forward design simplifies relamping
- Built in ON/OFF switch

Lightolier is a Philips Group Brand

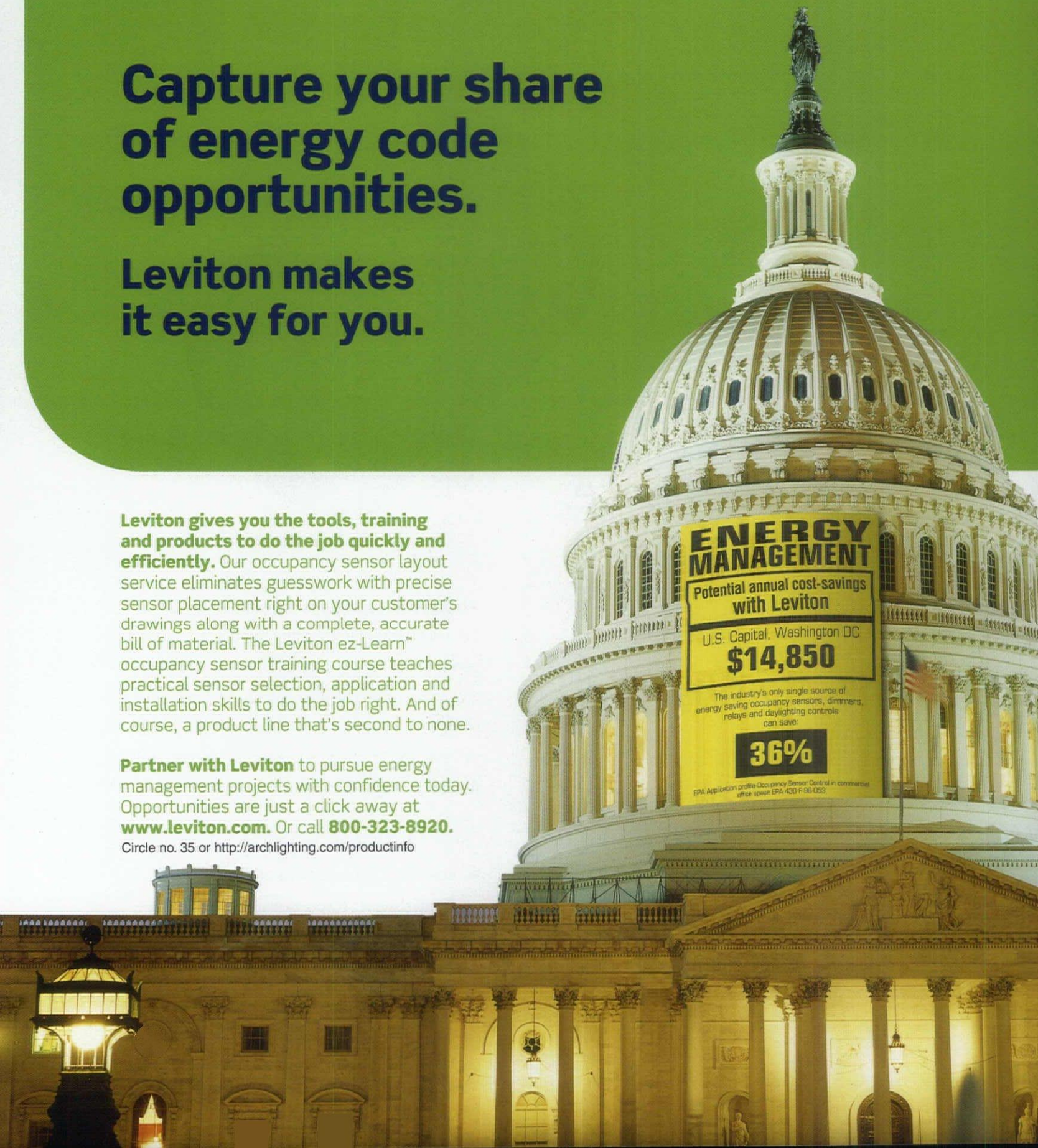
Circle no. 36 or
http://archlighting.com/productinfo

PHILIPS

LEVITON®

Capture your share of energy code opportunities.

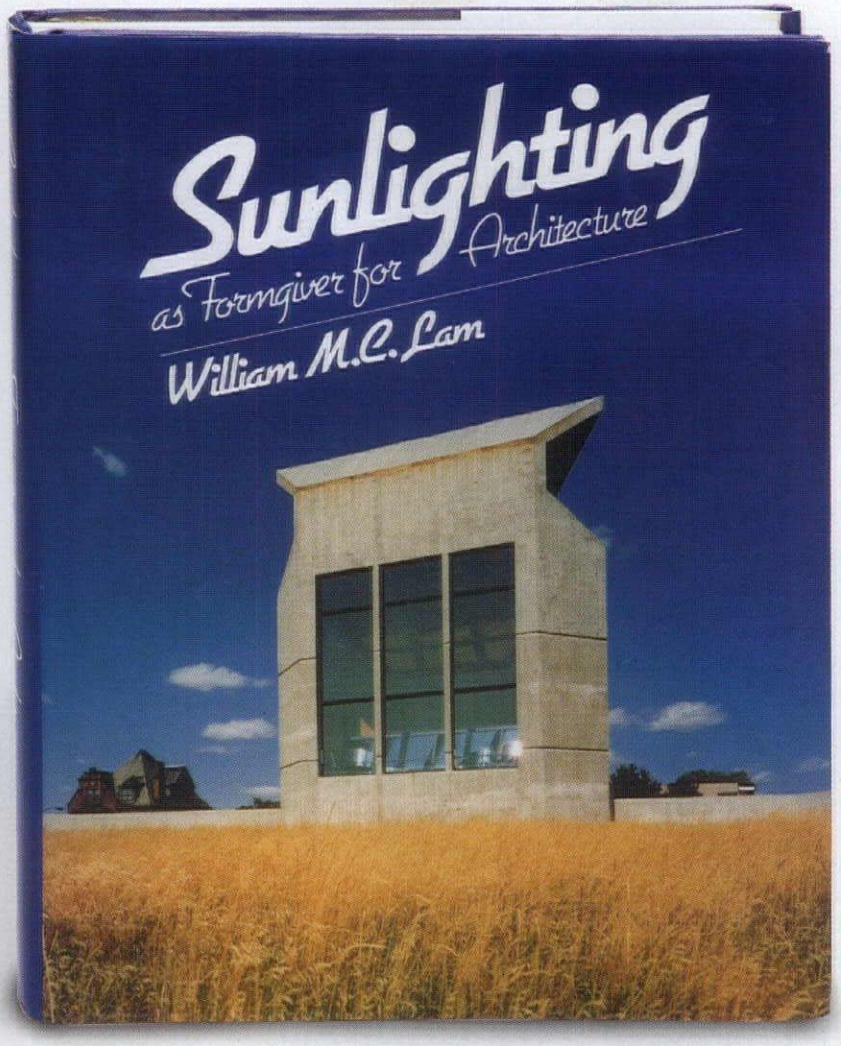
Leviton makes it easy for you.

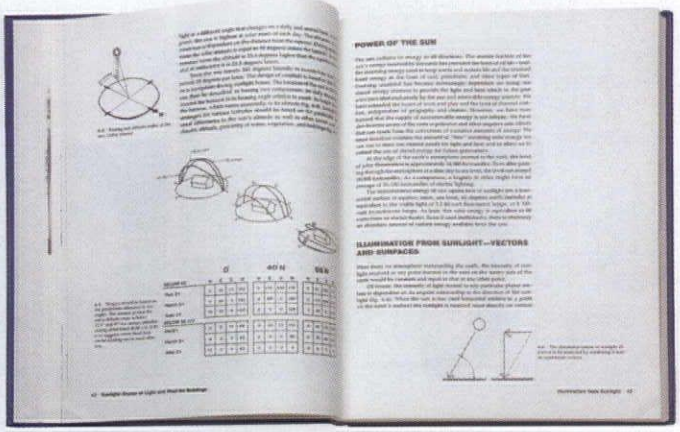


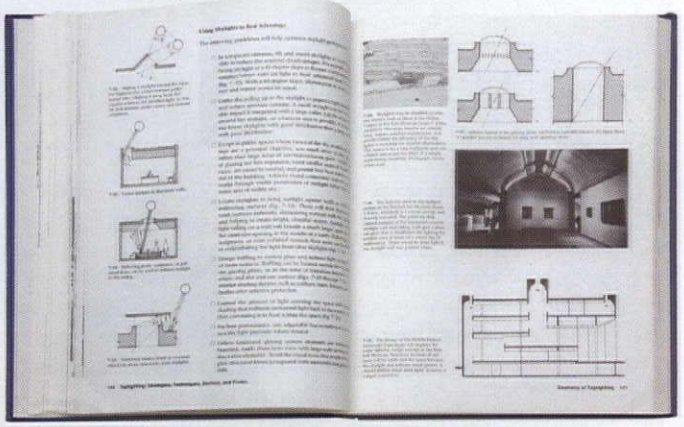
Leviton gives you the tools, training and products to do the job quickly and efficiently. Our occupancy sensor layout service eliminates guesswork with precise sensor placement right on your customer's drawings along with a complete, accurate bill of material. The Leviton ez-Learn™ occupancy sensor training course teaches practical sensor selection, application and installation skills to do the job right. And of course, a product line that's second to none.

Partner with Leviton to pursue energy management projects with confidence today. Opportunities are just a click away at **www.leviton.com.** Or call **800-323-8920.**

Circle no. 35 or http://archlighting.com/productinfo







***Sunlighting as Formgiver for Architecture* is as relevant today as it was when first published. Organized into two parts—design concepts and 25 case studies—the book re-examines the subject of daylighting and refines it to focus on sunlighting.**

AUTHOR | William M.C. Lam **PUBLICATION DATE** | 1986 **PUBLISHER** | Van Nostrand Reinhold Company, New York **PAGES** | 464
AVAILABILITY | Out of print. However, the text is available for download on the author's website at www.wmclam.com/publications.php

Sunlighting as Formgiver for Architecture

DESPITE THE FACT THAT THE TOPIC OF DAYLIGHTING HAS BECOME SO PREVALENT IN architectural and lighting design discussions and there is a wealth of written resources, there is no single title that has been recognized as the definitive reference on the subject matter. But one volume that comes close and has many lighting practitioners and daylighting specialists in agreement as being essential for a daylighting reference library is William M.C. Lam's *Sunlighting as Formgiver for Architecture*.

Developed from illustrated lecture handouts created for a series of talks Lam presented to the U.S. Department of Energy, AIA Energy Inform, and Solar Energy Research Institute Passive Solar Commercial Buildings programs in the 1970s, the book's relevance seems particularly timely today as a current generation of design practitioners tackle sustainable design and energy efficiency discussions.

Organized into two parts—design concepts and 25 case studies from Lam's own lighting consulting practice—the most interesting component of Lam's tome is his recasting of the discussion itself, from the subject of daylighting to sunlighting. As the book jacket describes, "Unlike daylighting, a primarily quantitative design approach that offers protection against the sun and is appropriate for climates with predominantly overcast skies (such as those of northern Europe), sunlighting is the positive control and utilization of the direct sunlight that is available in most parts of the worlds, including much of North America." In reframing the topic, Lam tackles some of the nuances of technique lost in the broad reach of many a daylighting discussion. As Lam describes in a recent telephone interview with *Architectural Lighting* magazine, "We need to return to a greater understanding of our buildings. People are still not paying attention to site, orientation, or form. Rather, they are using technical means to solve building problems." Lam always has been an advocate for developing lighting programs that reflect the specific needs and uses of a building, not simply relying on "numerical criteria." This was the focus of his first book published in 1977, *Perception and Lighting as Formgivers for Architecture*. While some of the architectural project case studies in the Sunlighting book might seem a bit aesthetically dated according to today's tastes, as sound examples of a core set of design principles for integrating sunlight into architectural spaces they remain as solid as ever. It is a title that should be considered essential reading for daylighting discussions and essential to the subject of lighting as a whole. **ELIZABETH DONOFF**

PHOTOS: CHARLIE BROWN

•termino

Daylight Dialect: Building a common daylight language will dramatically facilitate the necessary dialogue between architect, lighting designer, client, and contractor.

ON A THICKLY OVERCAST DECEMBER DAY IN 2005, A GROUP OF "DAYLIGHTING EXPERTS" CONVENED IN Portland, Oregon, to review a photocontrols research project presented by the Heschong Mahone Group. The presentation prompted an interesting discussion about what it means for a space to be **daylit**. A lively debate produced little agreement. It is common for experts to disagree; in fact, it is part of being an expert. But is it only the experts that do not agree or is this a more pervasive question among the entire design community?

Agreement over a defined daylighting vocabulary is not a new issue. One of the more recent attempts to work toward a more common vocabulary was a survey conducted by the National Research Council of Canada during the summer of 2005. (The survey results are published in the March 2008 issue of the journal *Building Research & Information*.) The survey of more than 150 architects and engineers worldwide presented five alternate definitions of daylighting. Each definition emphasized one of the following aspects: user comfort, electric lighting energy savings, overall building energy savings, peak energy demand reduction, or general economic benefits. Participating architects prioritized user benefits while engineers prioritized energy savings and economic benefits.

The survey results reinforce what many practitioners already realize: most designers working in the medium of daylight are a bit cloudy when it comes to explaining just what is meant by describing a building or a space as daylit. Or is the correct term "daylighted"? Even on this point there is no consensus.

What can we agree on? First, let us concur that daylight can be present in a space without the space being daylit. Too often, spaces with even a modest daylight feature, say a classroom with a few small windows, are described as daylit. In a daylit space, daylight is more than a feature; it accommodates the visual needs of the occupants allowing them to function in the space. Some experts say a daylit space must have **sufficient daylight** but not cause users to perceive **glare**. Additionally, some would argue that a daylit space must meet a lighting-quality or uniformity threshold. Others are more concerned that electric lighting energy savings are realized and that occupants have not disconnected the daylight sensing lighting controls. In truth, a daylit space is all of this and more.

In an attempt to wrap this set of ideas into a definition, let me posit that a daylit space provides daylight as the primary source of daytime illumination to accommodate the occupants' visual demands, is experienced as a visually and thermally comfortable place connected to outdoor phenomena, and persistently maximizes electric lighting energy savings while minimizing peak energy demand. By design this definition does not state how much daylight is necessary to accommodate the occupants' visual demands or what constitutes visual comfort. A definition that is specific enough for a particular space type will be useless for a general application. This is precisely why daylight is so challenging to understand and to successfully design into buildings.

These questions of sufficiency and comfort are not new. For more than 100 years daylighting researchers have wrestled with what constitutes sufficient daylight in a space and how to measure and predict human perceptions of glare. Definitions for daylight sufficiency were borne out of the early twentieth century British law and the principal of Right to Light—an easement provision under the Prescription Act of 1832 that ensures the owner of a building with windows that have received daylight for 20 years or more to prevent the construction of a building or obstruction that would interfere and deprive the existing building with said daylight illumination. In the mid-twentieth century, researchers evolved small source glare metrics for use with daylight but these have never been broadly accepted since they stem from electric light-source testing in laboratory settings with no daylight or view. This early dialogue made promising gains but largely was put on hold during the second half of the twentieth century because of the dominance of electric illumination. What persisted through these years was a sufficiency metric described as **daylight factor**.

Daylight factor (DF) is the most common metric for measuring daylight in a space. The measurement technique evolved over time and the threshold values recommended vary drastically, from 0.1 DF to 10 DF (0.001–0.10 of outdoor illumination) depending on occupancy type, regional lighting expectations, and historical time period. DF is easy to measure, is conceptually clear, can be considered point-by-point or as an average by space, and generally is consistent over time regardless of the amount of illumination outdoors. However, it is limited in use to overcast sky conditions, and therefore has garnered heavy criticism and is no longer considered a viable metric in abundantly sunny climates. Being that DF emerged from England's predominantly overcast skies, it should be no surprise that it does not work well in Southern California. Furthermore, DF does not give adequate information about visual comfort in a space, consider functions of time or sky condition, or suggest the likelihood for view potential or electric lighting energy savings to be realized, and it virtually ignores the energy impact from heat gain and loss through daylight aper-

ogy

tures. Practitioners are beginning to realize that additional metrics are necessary to adequately describe daylight in all its complexity.

Over the past decade a fundamental revaluation of the role of architecture in culture, improved expectations about building performance, and the increased demand for reducing energy use because of concerns about global climate change have resulted in a resurgence of building design for the inclusion of daylight. Daylighting researchers and practitioners alike are scrambling to keep pace with the ever-increasing demands for daylight design and analysis. New climatically and temporally sensitive metrics, categorized as dynamic daylight metrics, have been developed to provide a pathway forward. The most significant of these are **daylight autonomy**, **useful daylight illuminance**, and **daylight saturation percentage**. These metrics use site-specific weather files to calculate daylight performance over an entire space grid, typically using digital simulation tools. These metrics create new possibilities for design analysis, but their use is limited in field investigations because of their complexity.

Dynamic metrics will be a major component of future daylight design and analysis. By 2010, the Illuminating Engineering Society's (IES) Daylight Metrics subcommittee hopes to define a suite of metrics that experts can agree on and designers can understand and make use of in guiding the design process. Whatever metrics do evolve, it only makes sense that the corresponding thresholds related to daylight sufficiency, visual comfort, and other major aspects consider occupant needs and space types. It appears as though daylight metrics will become more complex. The challenge will be to keep these metrics relevant to practitioners.

Because of the complexity of daylight, design teams need to carefully analyze their daylighting design to build spaces with the potential of being daylit. Contractors and building users need to be educated about the intent of these designs for the built spaces to actually function as daylit spaces. Assuming the efforts of the IES Daylight Metrics subcommittee are successful, it will have taken more than 100 years to arrive at a consensus about what constitutes a daylit space. Let us hope it takes less time to decide what constitutes a **daylit building**. KEVIN VAN DEN WYMELENBERG

Kevin Van Den Wymelenberg is an assistant professor at the University of Idaho and director of the Integrated Design Lab in Boise, ID. He has degrees in architecture from the University of Wisconsin-Milwaukee and University of Washington. He teaches classes in daylighting and simulation techniques for integrated design to graduate students and design professionals in Boise, ID.

• Daylighting Glossary

1: daylight
2: daylit
3: sufficient daylight
4: glare
5: daylight factor
6: daylight autonomy
7: useful daylight illuminance
8: daylight saturation percentage
9: daylit building

1: **Daylight** is the natural light of day.

2: A **daylit** space provides daylight as the primary source of daytime illumination to accommodate the occupants' visual demands, is experienced as a visually and thermally comfortable place connected to outdoor phenomena, and persistently maximizes electric lighting energy savings while minimizing peak energy demand.

3: **Sufficient daylight** describes an amount of daylight that meets the minimum spatial lighting requirements as defined by consideration of occupancy type and schedule typically measured on a horizontal work plane.

4: **Glare** is a human sensation usually described as either discomfort glare or disability glare. As defined by the Commission Internationale de L'Èclairage (CIE) in 1957, disability glare is: "Glare which impairs the vision of objects without necessarily causing discomfort." Discomfort glare is: "Glare which causes discomfort without necessarily impairing the vision of objects."

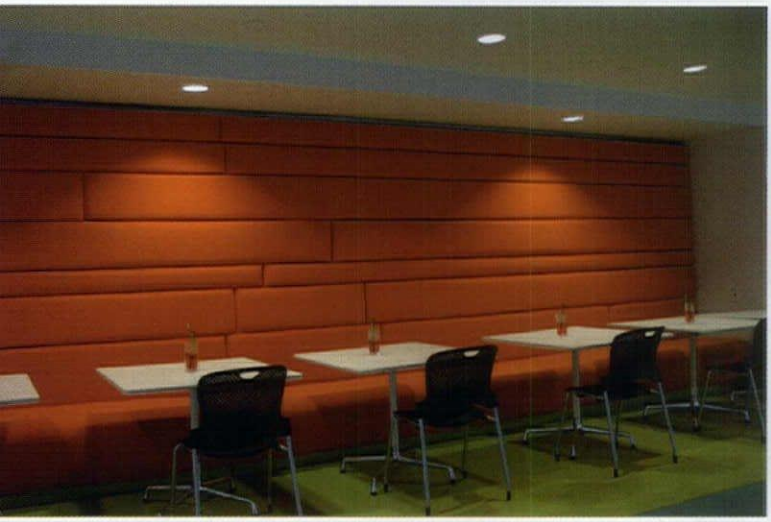
5: **Daylight factor** (DF) is a ratio that represents the amount of illumination indoors relative to outdoors at the same time. It typically is calculated by dividing a value of horizontal work plane illumination by the horizontal illumination available as measured horizontally on the roof of the building being tested. DF was developed at the beginning of the 20th century independently by A.P. Trotter and Percy J. Waldram, and was formalized by Waldram and his son in 1923 in a paper entitled, "The Natural and Artificial Lighting of Buildings," which appeared in the *Journal of the Royal Institute of British Architects, Vol. XXXII, No. 13*, pp. 405–426 and 441–446.

6: **Daylight autonomy** is represented as a percentage of annual daytime hours that various grid points in a space are above a specified illumination threshold. It originally was proposed by the Association Suisse des Electriciens in 1989 and was improved by Christoph Reinhart from 2001 to 2004. It is a major innovation because it considers location-specific weather information on an annual basis. It also can directly relate to electric lighting energy savings if the threshold set is based on electric lighting criteria.

7: **Useful daylight illuminance** is a modification of daylight autonomy conceived by architectural researcher John Mardaljevic in 2005. This metric bins hourly time values based on three illumination ranges, 0–100 lux, 100–2000 lux, and over 2000 lux.

8: **Daylight saturation percentage** is a modification of useful daylight illuminance that modifies the lower limit to 40 footcandles and increases the upper limit to 400 footcandles. It goes further to penalize grid point annual hour values above 400 footcandles by forcing them to be subtracted from the grid point annual hour values above 40 footcandles and below 400 footcandles. The Lighting and Daylighting Committee for the Collaborative for High Performance Schools program (CHPS) developed it in 2006.

9: **Daylit building** is a building with daylit spaces that represent a certain percentage of regularly occupied spaces with critical visual tasks.



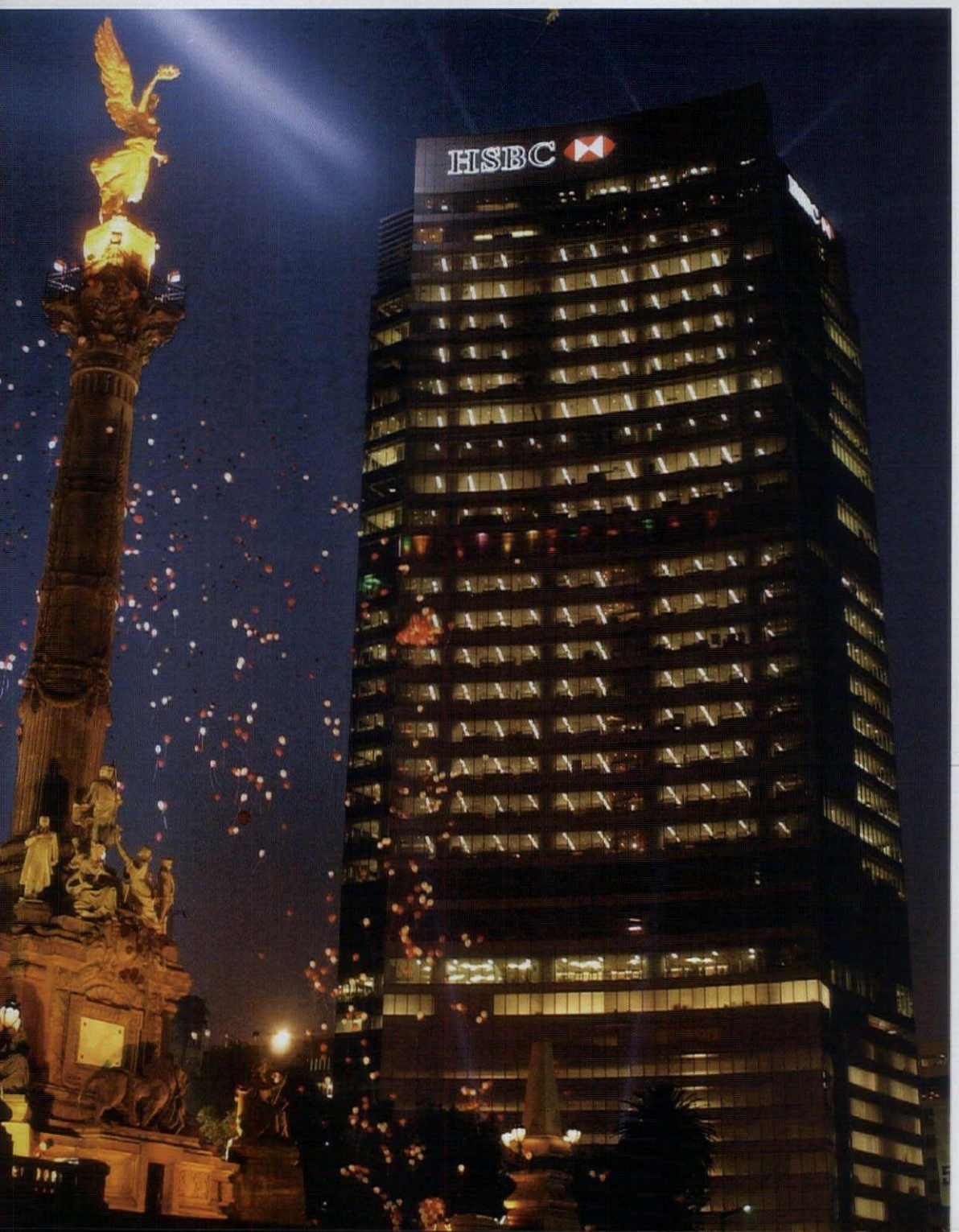
SOLAR STRATEGIES

The first implementation of a daylighting system in a Latin American high-rise office tower puts this Mexico City project on the map.

THINK SOPHISTICATED HIGH-RISE OFFICE BUILDING WITH COMPLEX DAYLIGHTING SYSTEMS and a bevy of projects in the United States and Western Europe come to mind—but not for long. With the recently completed HSBC Headquarters tower in Mexico City, a talented group of architects, interior designers, and lighting designers south of the border have announced their arrival on the daylighting scene. A series of firsts for a building in Mexico—the first implementation of a daylight harvesting system in a commercial high-rise office project and the first building in Latin America to receive Leadership in Energy and Environmental Design (LEED) Gold certification, the 33-story structure blends technological innovation while staying true to its Latin American roots.

Located on the Paseo de la Reforma, Mexico City's main thoroughfare, and overlooking "The Angel of Independence," a victory column built to commemorate Mexico's War of Independence, the building is home to more than 2,000 people on a daily basis. Overseeing the building design was HOK's Mexico City office, led by architect Juan Carlos Jimenez, who was hired by Latin American developer GICSA to redesign the core and skin of the building whose foundations already were in place. The building program includes 22 floors of open office area, meeting rooms, an auditorium, executive floors, a cafeteria, on-site exercise facilities, a top-floor winter garden, and a 10-story underground parking garage.

To fulfill the client's primary objective—to achieve energy savings—coupled with the narrowness of the floor plate (a result of the building's floor plan and convex southeast-facing façade overlooking the Paseo de la Reforma) and the office areas being occupied about 12 hours a day, the design team analyzed several options and arrived at a comprehensive lighting control system fully equipped with central control switching panels, daylight and occupancy sensors in the main façade, and stand-alone dimming. The result is a lighting design that principal lighting designer Maria de los Angeles Escobedo of Mexico City–based Unicorp explains saves more



The first building in Latin America to receive Gold LEED certification, the 33-story HSBC Tower blends technological innovation while staying true to its Latin American roots (left). From left to right, top: Sophisticated interiors in the cafeteria, winter garden, and elevator corridors provide a decorative counterpoint to the open office areas where a comprehensive daylight harvesting control system keeps the space illuminated by night and day.

General illumination for the double-height lobby entry is made possible by 35W ceramic HID downlights (facing page). A mural depicting Mexican themes painted by Mexican artist Juan O'Gorman (1905-1982) is accented by 250W PAR38 incandescent fixtures that comply with museum and artwork illumination guidelines (left, top). Ambient light in the winter garden supplied by 35W ceramic HID downlights does not compete with the spectacular views of the mountains that surround Mexico City (left, bottom).

PHOTO (RIGHT): ADRIAN WILSON

DETAILS

PROJECT | HSBC Tower, Mexico City
CLIENT | HSBC Mexico, Mexico City
DEVELOPER | GICSA, Mexico City
ARCHITECT | HOK, Mexico City
INTERIOR DESIGNER | Studio Rossellini, Buenos Aires, Argentina
LIGHTING DESIGNER | Unicorp, Mexico City
PROJECT SIZE | 400,000 square feet
WATTS | 1.09 watts per square foot (open office areas)
PHOTOGRAPHER | Juan Jose Diaz Infanta, Mexico City

MANUFACTURERS | APPLICATIONS

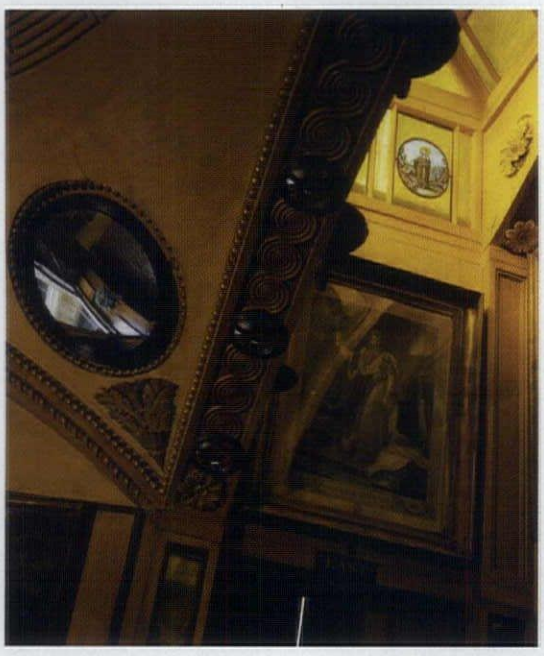
JUNO CERAMIC HID | Downlights in the lobby and winter garden; MR16 flexible track luminaries throughout the project
LIGHTOLIER | Cafeteria compact fluorescent downlights and halogen wallwashers throughout the project
LUTRON | Graphik 7000 lighting control system with dimmable addressable ballasts
PHILIPS | T8 2-lamp ceiling recessed indirect/direct luminaire in the open office areas

than 54 percent of the energy model for the LEED daylighting credit 8.1 and environmental quality credit 8.2. Because each face of the building receives daylight, approximately 14 types of glass are used on the façade, the principal being low-E with a white frit pattern that coincides with the office floors. On the interior, in concert with the lighting equipment, manual shades are concealed in a perimeter ceiling soffit at the curtain wall edge.

In the open office areas, 2-lamp dimmable T8 fluorescent ceiling-recessed fixtures with a baffle and special reflector, to achieve uniform light distribution, and an addressable ballast are spaced in the ceiling every 10 feet on center. The first row of luminaries is set back approximately 12 feet from the curtain wall. The lighting design complies with ASHRAE/IESNA 90.1-2004 guidelines. Each of the 416 lighting circuits are controlled through a main processor and enable multiple energy savings presets, which also are linked to the overall building management system.

HOK, partnering with Argentinian interior designer Enrica Rossellini, blends contemporary aesthetics and a vibrant color palette to decorative features throughout the project to highlight the building's architectural features. General illumination for the double-height lobby entry is made possible by 35W ceramic HID downlights. A mural depicting Mexican themes painted by noted Mexican artist Juan O'Gorman (1905-1982), relocated from another bank purchased several years prior by HSBC, is reinstalled in the space and accented by 250W PAR38 incandescent fixtures that comply with museum and artwork illumination guidelines. For the elevator corridors, T8 asymmetrical lamps concealed in a lateral cove line the ceiling edge. A recessed cove running down the center of the corridor floor houses a linear array of T5HO lamps whose light is diffused by sandblasted glass. In the cafeteria, 32W compact fluorescent downlights provide task light at the seating banquets while highlighting the interior finish selections and bold colors of orange and lime. In the winter garden, white LED rope lights are clustered behind glass panels, which form a column cover and create a sculptural feature. The space's reflective floor and ceiling surfaces further cast an ambient glow throughout the space. As this area along the Paseo de la Reforma re-emerges as a prominent business district, the architecture and lighting is following suit, establishing Mexican designers as prominent contributors to the current architectural and lighting design landscape and global discussions of sustainability. **ELIZABETH DONOFF**


BREAKFAST ROOM
WEST



Soane described the breakfast room at No. 13 Lincoln's Inn Fields (facing page), as "a succession of fanciful effects, which constitute the poetry of architecture." A light, shallow dome stretches across the center of the room and is illuminated by an octagonal skylight filled with panels of colored glass. Soane, intrigued by the potential to transform space with optical devices, placed mirrors strategically throughout the room to reflect the colored light from the skylights and refract images from the nearby library and external vista (left).

LUMIÈRE MYSTÉRIEUSE

DAYLIGHTING IN THE WORK OF SIR JOHN SOANE.

FEW FIGURES OF THE ROMANTIC ERA HAVE HAD AS PROFOUND AN IMPACT ON ARCHITECTURE OF THE PAST 50 years as Sir John Soane (1753-1837), the English master of lumière mystérieuse, that mystical, mysterious atmosphere achieved through a variety of light effects, including skylights, mirrors, and concealed lamps. Light itself was an essential building material to Soane, who developed innovative daylighting systems, often combined with colored glass and other optical enhancements, to create dramatic, ever-changing scenes throughout his interiors. Among the most innovative of Soane's lighting techniques can be found at his home, 12-14 Lincoln's Inn Fields (now the Soane Museum) in the London borough of Camden, and in south London at the Dulwich Picture Gallery, the first purpose-built public art gallery in Britain. These two early nineteenth-century buildings exemplify Soane's ability to use light—particularly daylight—as a means of enhancing, even transforming, architectural form.

12-14 LINCOLN'S INN FIELDS

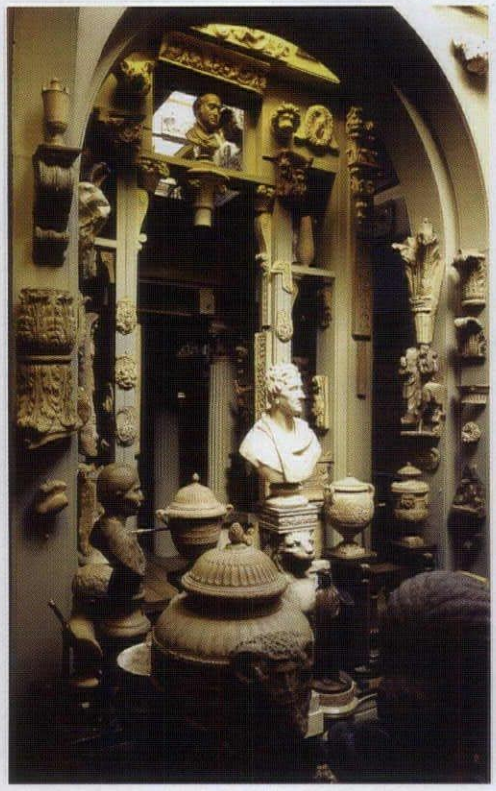
Soane's house at 12-14 Lincoln's Inn Fields functioned as a kind of laboratory, a place where he could endlessly alter and modify his designs, occasionally borrowing techniques from past commissions and often pioneering new methods. In creating this remarkable structure, Soane demolished and subsequently reconstructed three townhouses beginning in 1792, and continuously modified and added to the house and its contents until his death. The long history of this complex building project began with No. 12, which Soane rebuilt from 1792 to 1794. Soane subsequently reworked No. 13 in two phases in 1808–9 and again in 1812. The reconstruction concluded with No. 14, which he rebuilt from 1823 to 1824. The resulting house served not only as his family home, but also as a repository and showcase for his marvelously eclectic collection, which is composed of tens of thousands of items, including antiquities such as the sarcophagus of Seti I, medieval architectural fragments, paintings by Italian and British masters, books and prints. Soane displayed these treasures to the benefit of his architecture students at the Royal Academy.

Soane's interest in the transformative powers of light on architectural form is evident throughout the house, in both public and private areas. The breakfast room in No. 13, a space described by Soane as "a succession of fanciful effects, which constitute the poetry of architecture," contains some of the architect's most innovative daylighting techniques. A light, shallow dome, which Soane preferred to call a canopy, stretches

The exterior façade of Soane's home and museum at 12-14 Lincoln's Inn Fields (above). Soane's extensive collection of paintings is displayed in the picture room (right). The small chamber is lit using both a skylight and a high clerestory, providing a combination of both vertical and a raking, ever-shifting light down onto the paintings, which Soane stored on a series of hinged panels. His impressive collection of building fragments, antiquities, and plaster casts of ancient sculpture are displayed in the area of the house referred to by Soane as the museum (facing page, top left), which are arranged in richly textured layers intended to provide maximum dramatic visual effect. Natural light infuses the stairwell courtesy of a skylight (facing page, middle). At the Dulwich Picture Gallery (facing page, top right), Soane employed a system of top lit galleries.

DETAILS

PROJECT | Sir John Soane's Museum, London
ARCHITECT | Sir John Soane
PROJECT SIZE | Three adjacent townhouses
PHOTOGRAPHER | Martin Charles, courtesy of the Soane Museum, London (unless otherwise noted)
DAYLIGHTING STRATEGY | Toplighting, colored glass, and the extensive use of mirrors for light amplification and reflection.



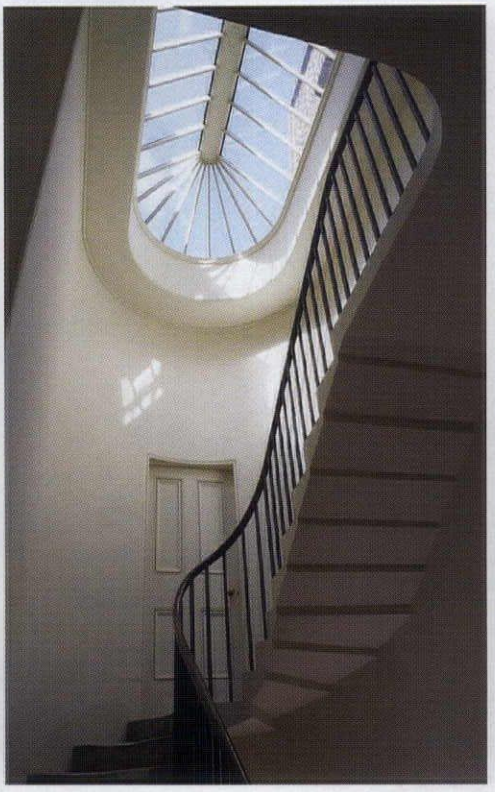


PHOTO (LEFT) COURTESY OF THE DULWICH PICTURE GALLERY

across the center of the rectangular room and is illuminated by an octagonal skylight filled with panels of colored glass with two additional flat skylights flanking the dome on either side. Soane, intrigued by the potential to transform space with optical devices, placed mirrors strategically throughout the room to reflect the colored light from the skylights and refract images from the nearby library and external vista. He placed convex mirrors in the dome's pendentives, as well as alternating clear and mirrored glass in the two sets of double doors leading into the breakfast room. Through the simple manipulation of the mirrored doors, Soane provided an endless array of picturesque views, reflecting the diverse nature of the remarkable house.

As a perpetual student and teacher of architecture, Soane amassed a large collection of building fragments, antiquities, and plaster casts of ancient sculpture, that he felt provided an exemplary foundation for the study of classical principles of design. Most of these items were displayed in the remarkable area of the house referred to by Soane as the museum. Perhaps inspired by the atmospheric engravings of the Italian designer Giovanni Battista Piranesi, he arranged the objects in richly textured layers intended to provide maximum dramatic visual effect. Lighting was supplied by a combination of daylight and artificial sources, including a magnificent colored glass dome toplighting the space, and concealed oil lamps throughout the double-height gallery. Soane was particularly interested in light's ability to change the appearance of sculpture, and the collection was further transformed at night, when light from oil lamps and candles provided atmospheric illumination. The resulting effect was a space of mystery and poetry, two qualities Soane pursued throughout his career.

A similar assemblage of sculptural fragments, arranged on a more intimate, personal scale, can be found in Soane's private study and dressing room. This area, like the museum dome, is illuminated by a skylight filled with yellow glass. The light from this aperture is further modified through the use of angled mirrored surrounds, which refract and reflect the yellow-tinted daylight, suggesting the warmth of the Roman sun that Soane encountered on his studies in Italy as an architecture student.

Soane's house, which he negotiated as an act of Parliament in 1833 (and went into effect upon his death in 1837) to preserve for benefit and education of "amateurs and students" of architecture, remains one of architecture's most eloquent examples of light's ability to alter, transform, and manipulate space.

DULWICH PICTURE GALLERY

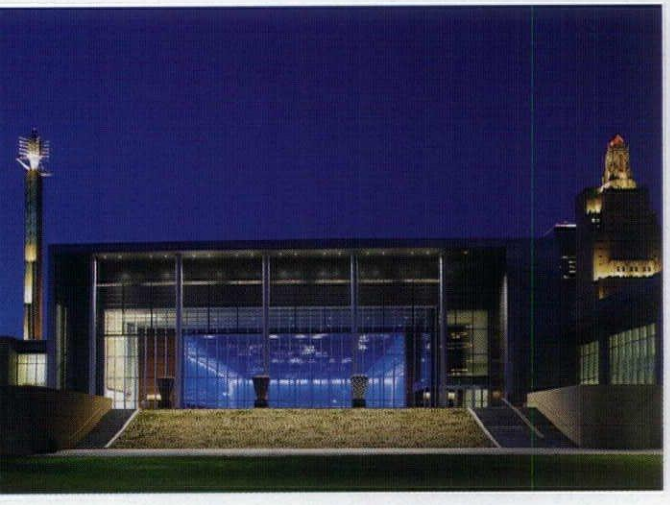
Like his home, the Dulwich Picture Gallery—designed by Soane and opened to the public in 1817 as the first public art gallery in Britain—also has inspired countless architects, lighting designers, and others in their own explorations of light and form. With its austere, astylar exterior in London brick and simple, top lit enfilade of galleries, the Dulwich often is cited as one of the most influential museum building designs.

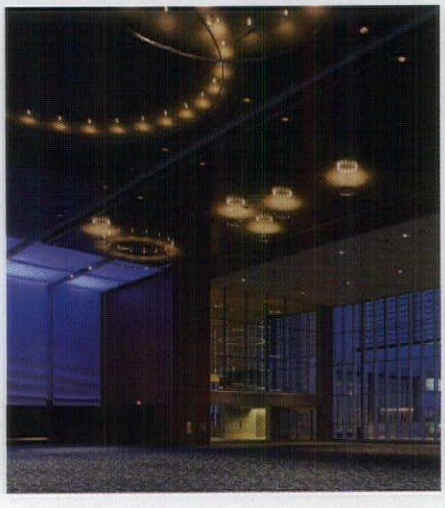
In his original scheme for the Dulwich, Soane designed an ingenious system of both vertical and sloping lanterns in each of the five sequential galleries, which provided sufficient light without creating glare on the paintings. To further prevent overlighting of the pictures, the architect proposed to fill in the caps of the lanterns as a means of diffusing the daylight penetrating into the gallery, so that no direct sunlight struck the paintings. Financial restrictions led to Soane using more conventional octagonal lanterns, although a restoration of the gallery in 2000 enabled the installation of the monitor lights largely as conceived by Soane.

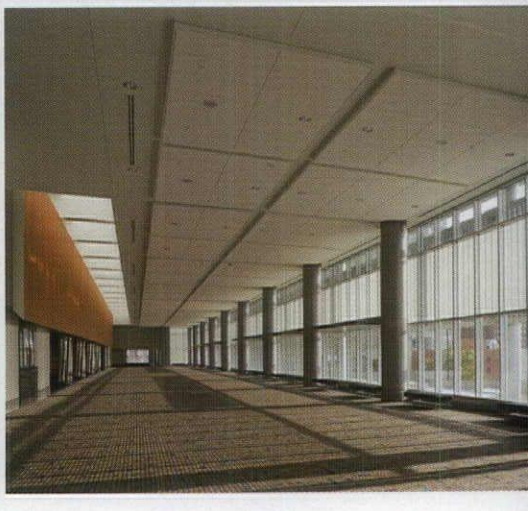
CONTEMPORARY INFLUENCE

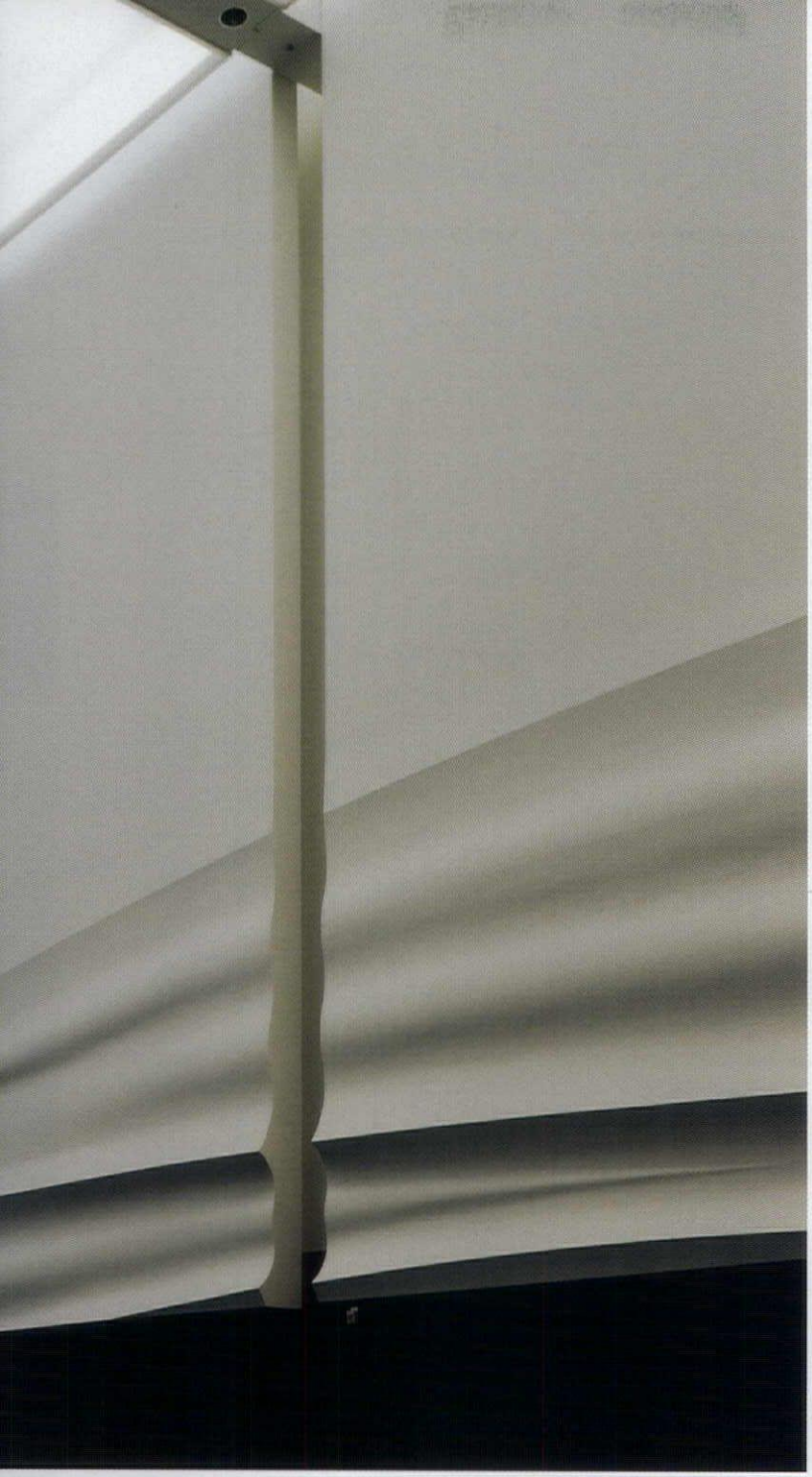
Across time and radical stylistic differences, contemporary architects and lighting designers remain inspired by Soane's gift for deploying daylighting techniques in creating complex, multi-textured programs of space and light, programs that reflect Soane's "poetry of architecture." His lighting strategies and spatial explorations can be seen in the attenuated apertures providing diffused and poetic daylighting throughout Louis Kahn's Kimball Art Museum in Fort Worth, Texas, to Venturi, Scott Brown & Associate's faithful yet modernized interpretation of the Dulwich's rhythmic progression of galleries and its lighting systems in the Sainsbury Wing of the National Gallery in London, to Rafael Moneo's Museum of Roman Art in Merida, Spain. As New York City–based architect and lighting designer Richard Renfro, whose portfolio includes a number of significant museum projects including the recent Bloch addition at the Nelson-Atkins Museum of Art in Kansas City, Missouri ("Sculpting With Light," Architectural Lighting, Sept/Oct 2007, p. 44), comments, it is the "magic of daylight softly flowing from hidden sources above" that ultimately makes Soane's work an enduring touchstone for modern architectural design. **ALEXANDRA GRIFFITH WINTON**

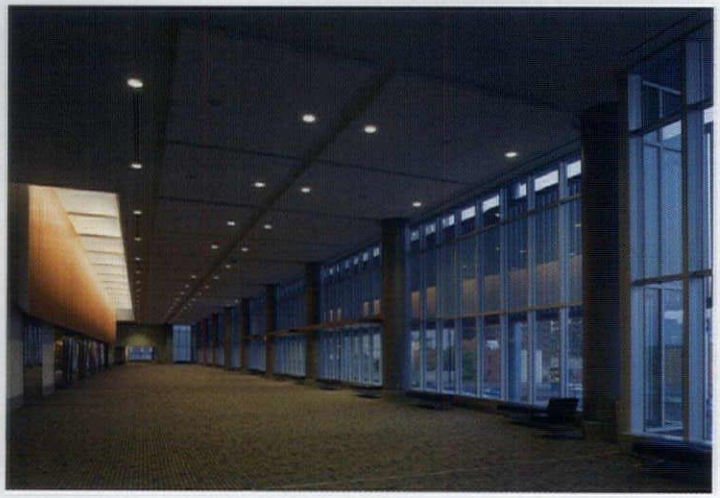
Daylight pours into the Bartle Hall Ballroom via clerestories on the north, east, and west sides of the room. Like the ceiling's translucent stretched-fabric panels, the sculpted wall panels take on the various qualities of light and shadow, revealing exterior conditions and time of day (right). Below from left to right: At night, the ballroom takes on a lantern-like quality and allows views inside. With the partition wall open, the prefunction area becomes part of the ballroom. Suspended custom ring LED luminaires convey the presence of a chandelier and are a metaphor for drops of water. The lobby, attached to the ballroom on its east side, also employs natural light and creates a brightly lit entrance to the convention center. At night, the space is illuminated by compact fluorescent downlights and ceramic metal halide wallwashers.











(UN)STRICTLY BALLROOM

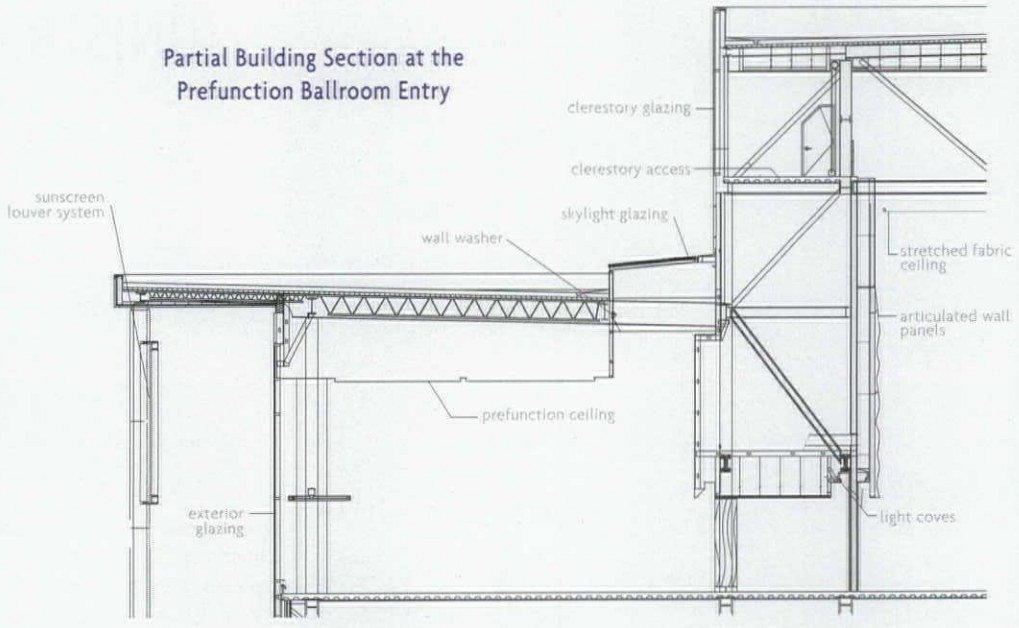
A design inspired by daylight and water offers an ever-changing atmosphere.

RANKED AMONG THE 10 LARGEST CONVENTION CENTER BALLROOMS IN THE NATION, KANSAS CITY, Missouri's Bartle Hall Ballroom is, needless to say, enormous, encompassing a vast 46,450 square feet. Even more monumental was local lighting design firm Derek Porter Studio's task of lighting the large-scale space so it could yield numerous environments for a variety of functions while capitalizing on daylight to conserve energy and introduce natural light into the space.

Just one part of a multiphase expansion of the convention center, the new state-of-the-art ballroom not only provides more flexible space to the facility's repertoire of offerings (for events including exhibits, lectures, performances, and galas), but also strengthens the convention center's role as an anchor for the revitalization of the downtown area, which is experiencing unprecedented growth with the new Sprint Center arena, a nine-block entertainment and residential area known as the Power & Light District, and the Kauffman Center for the Performing Arts.

In a departure from traditional "black box" ballrooms that offer no context to site orientation or exterior surroundings, daylight pours through clerestories on the north, east, and west sides of the room. Translucent stretched-fabric panels measuring 8-, 15-, and 30-feet, respectively, on the north, west, and east sides of the ballroom border the ceiling perimeter, diffusing the sunlight as it moves across the space over the course of the day. "Being time-based, the light is always changing and revealing the exterior condition in various ways, so you really feel the dynamic changes of the room and how natural light sculpts and gives orientation to the space," explains Derek Porter, principal designer and owner of Derek Porter Studio. "We purposefully wanted those shadows and projections to move across the translucent ceiling surface so you see the exposed structure inside the light-well, revealing the temporal presence of daylight as well as diffusing the direct sunlight entering the room."

The natural light has proved to be Porter's favorite element of the design. "Feeling the light move through the space naturally and diffusely through the stretched fabric is just magical," he says. Providing both visual animation and orientation while offering energy conservation and substantial functional illumination, the daylight footcandle level (with no electric lighting) ranges from 60 footcandles underneath the stretched-fabric panels to 20 footcandles in the middle of the room. However, for those events requiring a specific theatrical scene with electric lighting, motorized blackout shades in the clerestories can be employed.



A partial building section at the prefunction ballroom entry shows the relationship between the ballroom's suspended ceiling, the stretched-fabric panels, and the clerestories (right). The translucent stretched-fabric panels measure 8-, 15-, and 30-feet, respectively, on the north, west, and east sides of the ballroom, diffusing the sunlight as it moves across the space from early morning (facing page, top) to mid-day (facing page, center) to late afternoon (facing page, bottom).

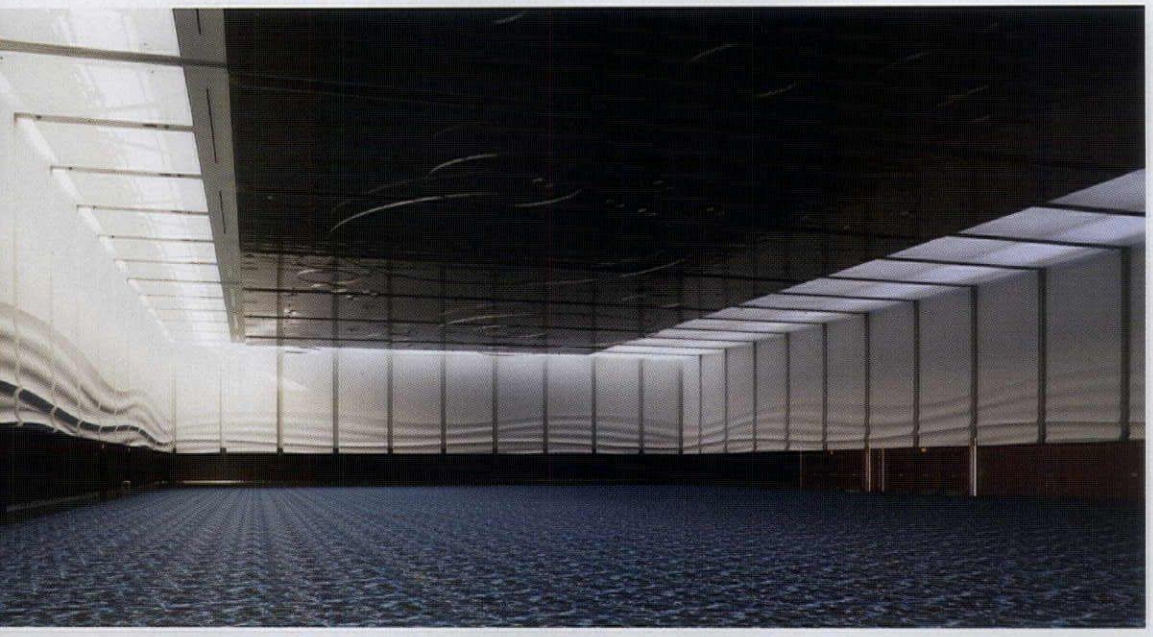
Working independently of and in concert with the natural light, electric lighting can be used to create seemingly countless illumination combinations. A variety of light sources and fixtures were used to meet the diverse programmatic needs, providing both general illumination and task lighting, including 250W PAR38 recessed halogen downlights; photocell-controlled dimmable 18W, 26W, and 42W compact fluorescent downlights; 14W and 28W T5 and 54W T5HO linear fluorescents that run continuously and transversely across the ceiling; and 39W and 150W T6 ceramic metal halide wallwashers. To keep the focus on the design, fixtures were carefully incorporated within the ceiling and other interior design elements.

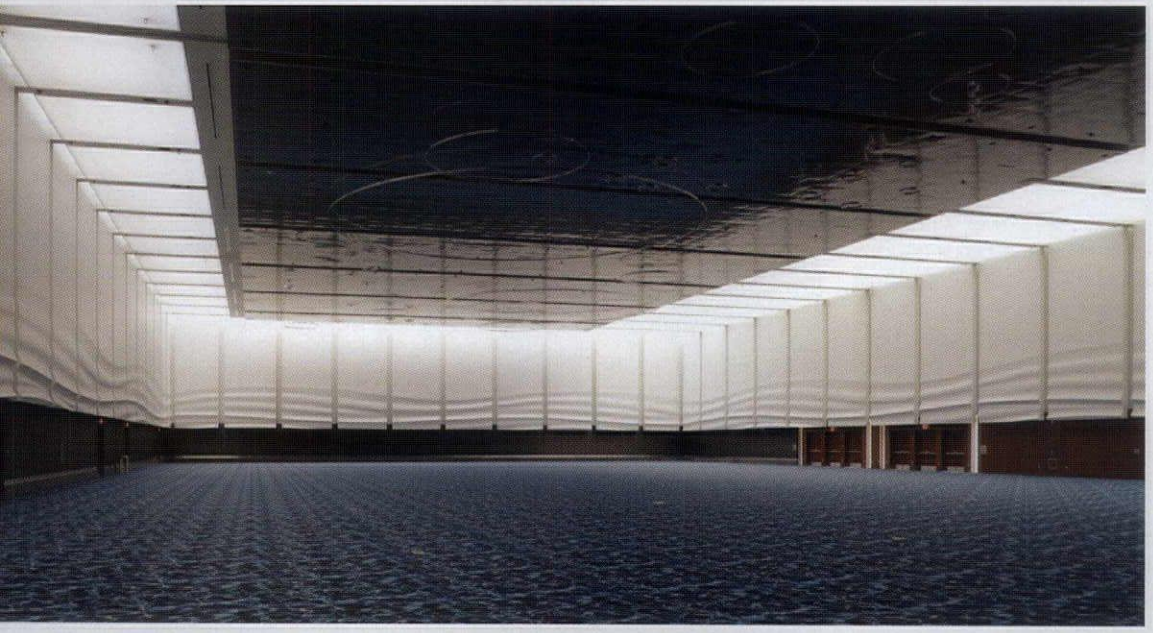
However, two aspects of the electric lighting scheme stand out. First are the custom polished aluminum ring luminaires suspended from the ceiling which, according to Porter, convey "the presence of a chandelier" and add a decorative edge to the space. Ranging in size from 2 1/2 feet to 50 feet in diameter, they house warm-white LEDs (oriented upward) that reflect in the specular metal panel ceiling. "Their physical form is a metaphor for drops of water," Porter explains. "Because you only see an image of the lights, it adds a layer of spatial depth, translucency, and reflectivity." Second is the sophisticated LED lighting system made up of two banks of LEDs: one to backlight the stretched-fabric ceiling panels and the other to graze the 30-foot-tall white-painted glass fiber reinforced gypsum (GRGF) wall panels that line three sides of the room. Developed with narrow, medium, and wide beam distributions to minimize the physical massing of hardware in the clerestory vaults, the custom color-changing luminaires can be programmed for any purpose. While standard scenes of fixed colors are pre-set, "the ceiling and walls are all programmed independently of each other, so it can be quiet and conventional, and then you can have some glitzy ceremony with flashing lights and music," Porter says.

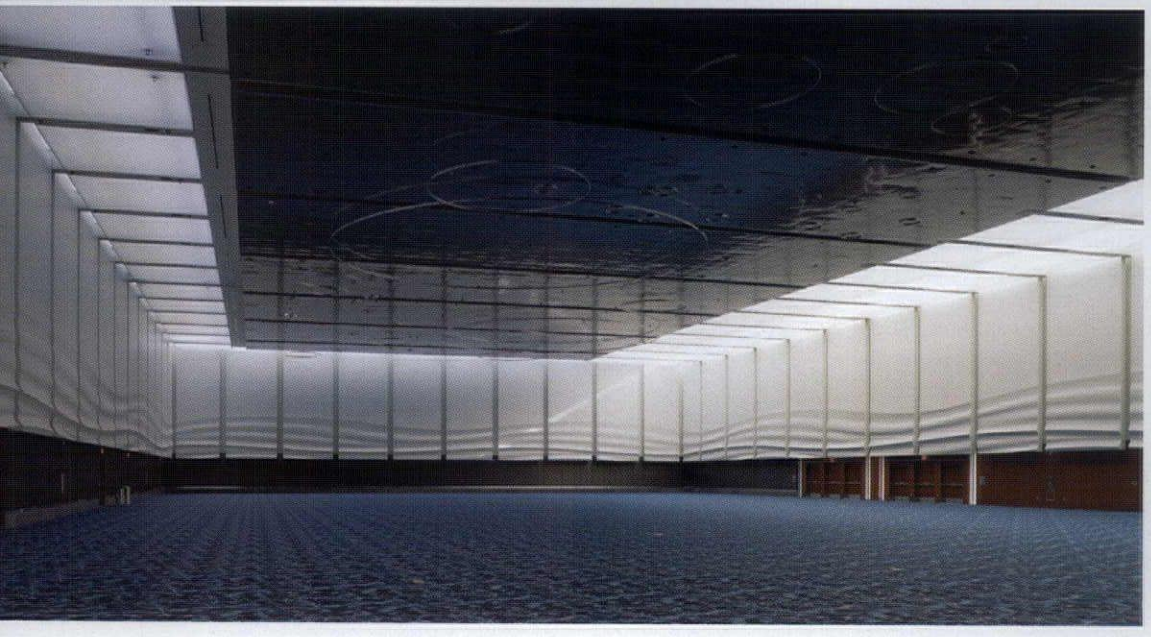
Like the custom ring luminaires that abstractly reference the project's theme of water—a fitting choice given the city's location on the nexus of the Kansas and Missouri rivers and its identity as the "City of Fountains"—the GRGF panels take on various qualities of light and shadow and make a more literal reference to water with their sculpted wave pattern. In addition, suspended, perforated, specular ceiling panels (with an acoustical absorption property) reflect qualities of the interior environment, adding another layer of depth to the space.

With such an integrated and elaborate daylighting and electric lighting system, the ballroom requires equally sophisticated controls. Consequently, each fixture can be independently programmed so the lighting can be adjusted to accommodate specific room configurations. Custom networking and LCD control panels were developed to link three disparate systems—DALI (digital addressable lighting interface) for the house lights, theatrical controls for the color-changing LEDs, and another set of controls for the facility management system—to improve usability, address diverse programmatic needs, conserve energy (through daylight harvesting controls), and "achieve the advanced end goal while not making it so apparently visual," Porter notes. To put the scope of the ballroom's controls in perspective, the custom LCD control panel contains a digital color wheel that controls 361 color-changing LED luminaires tied to 930 channels.

With all of these components, the project was not without its share of challenges. "On one level it was a luxurious project because there was a lot of ambition and the client and design team were totally on board," Porter explains, "but at the same time it was a city project and there are budgets and maintenance factors that had to be considered, people you had to convince of desired intent, and color combinations, mock-ups, and technology that had to be worked out." But, in the end, Porter says, "It was all worth it." Very much a collaborative effort among the team of architects, interior designers, lighting designers, and other consultants, the project strikes a balance between conceptual and practical objectives, a great asset for a project where the design team could have pursued typical layout strategies—inward-focused spaces devoid of connection to the outside and light. Rather, the design strategy, initiated by Porter and his team, provide the unexpected—daylight—and in turn create a compelling space not usually associated with the building typology of a convention center or ballroom. Thanks to the incorporation of daylight, the space is given a sense of scale, and its occupants a sense of time and place. **SALLIE MOFFAT**







DETAILS

PROJECT | H. Roe Bartle Hall, Kansas City Convention Center Ballroom Expansion, Kansas City, Missouri
CLIENT | City of Kansas City, Missouri
ARCHITECT/INTERIOR DESIGNER | HNTB, Kansas City, Missouri
LIGHTING DESIGNER | Derek Porter Studio, Kansas City, Missouri
SUSTAINABILITY DESIGN CONSULTANT | BNIM, Kansas City, Missouri
ELECTRICAL ENGINEER | Henderson Engineers, Lenexa, Kansas; Lightworks, Weston, Missouri
LIGHTING CONTROL DESIGNER | Jones & Phillips, Lafayette, Indiana; Derek Porter Studio, Kansas City, Missouri
PROJECT SIZE | 135,000 square feet (including the 46,450-square-foot ballroom)
LIGHTING COSTS | $55 million (including lobby and prefunction areas)
WATTS | .8 (lobby and prefunction areas); 2.4 (ballroom)
PHOTOGRAPHER | Michael Spillers, Kansas City, Missouri
DAYLIGHTING STRATEGY | Sunscreen louver system on exterior façade; skylight system in prefunction-area; and perimeter clerestories/light-wells with diffusing panels for natural light in ballroom.

MANUFACTURERS | APPLICATIONS

ARMSTRONG | Prefunction–area ceiling
BEGA | Exterior steplights
CEILINGS PLUS | Ballroom metal ceiling
CONSTRUCTION SPECIALTIES | Prefunction-area louvers
DRAPER | Prefunction-area shades
ELLIPTIPAR | Asymmetric wallwash in prefunction-area and ballroom
ETC (WITH CITY THEATRICAL CEILING MOUNT) | Ballroom podium lighting
ETC PHAROS | Color-changing LED controls
FOCAL POINT | Prefunction-area recessed linear fluorescents
H.E. WILLIAMS | Prefunction-area staggered strips outlining entry stairs
INFINITY | Prefunction-area hallway downlights
KURT VERSEN | Prefunction-area, ballroom, and exterior recessed downlights
LITECONTROL | Prefunction-area and ballroom perimeter lighting
LOUIS POULSEN | Exterior pedestrian poles
MODULAR | Ballroom adjustable downlights
MODULARARTS | Ballroom sculpted GRGF wall panels
NATURALITE SKYLIGHT SYSTEMS | Prefunction-area skylight glazing
NEWMAT USA | Ballroom stretch-fabric ceiling
OLDCASTLE GLASS | Prefunction-area storefront glazing; ballroom clerestory glazing
OSRAM | Lamps throughout the project
PERFORMANCE SOLUTIONS | Blackout shades at ballroom clerestories
PHILIPS | Lamps throughout the project
POWER VECTOR | Ballroom color-changing LEDs
SELUX | Exterior area lights; ballroom linear fluorescents
STARFIELD CONTROLS | DALI controls; interior photocells; interior occupancy sensors
TRIDONIC | DALI ballasts
WINONA LIGHTING | Decorative rings at prefunction entry and ballroom; ballroom color-changing LEDs; prefunction-area asymmetric wallwash

CABIN FEVER

A RESEARCH FACILITY IN THE SMOKY MOUNTAINS UTILIZES ITS SURROUNDINGS TO PROVIDE A SUSTAINABLE DESIGN.

SUSTAINABILITY IS AT THE FOREFRONT OF THE TWIN CREEKS SCIENCE AND EDUCATION CENTER, a National Park Service (NPS) research facility named for two nearby trout streams and nestled in the Great Smoky Mountains National Park. A key element of the building's sustainable approach is the lighting design, which heavily relies on daylighting.

"Daylighting allows you to reduce cooling loads, fan power, and all the other things that can end up reducing capital costs in the building," says Victor Olgyay, principal of the Rocky Mountain Institute (RMI) Built Environment Team, who worked on the project's lighting design while at architectural-engineering firm ENSAR Group before it merged with RMI. "The daylighting and electric lighting integration was a huge part of reducing the energy loads."

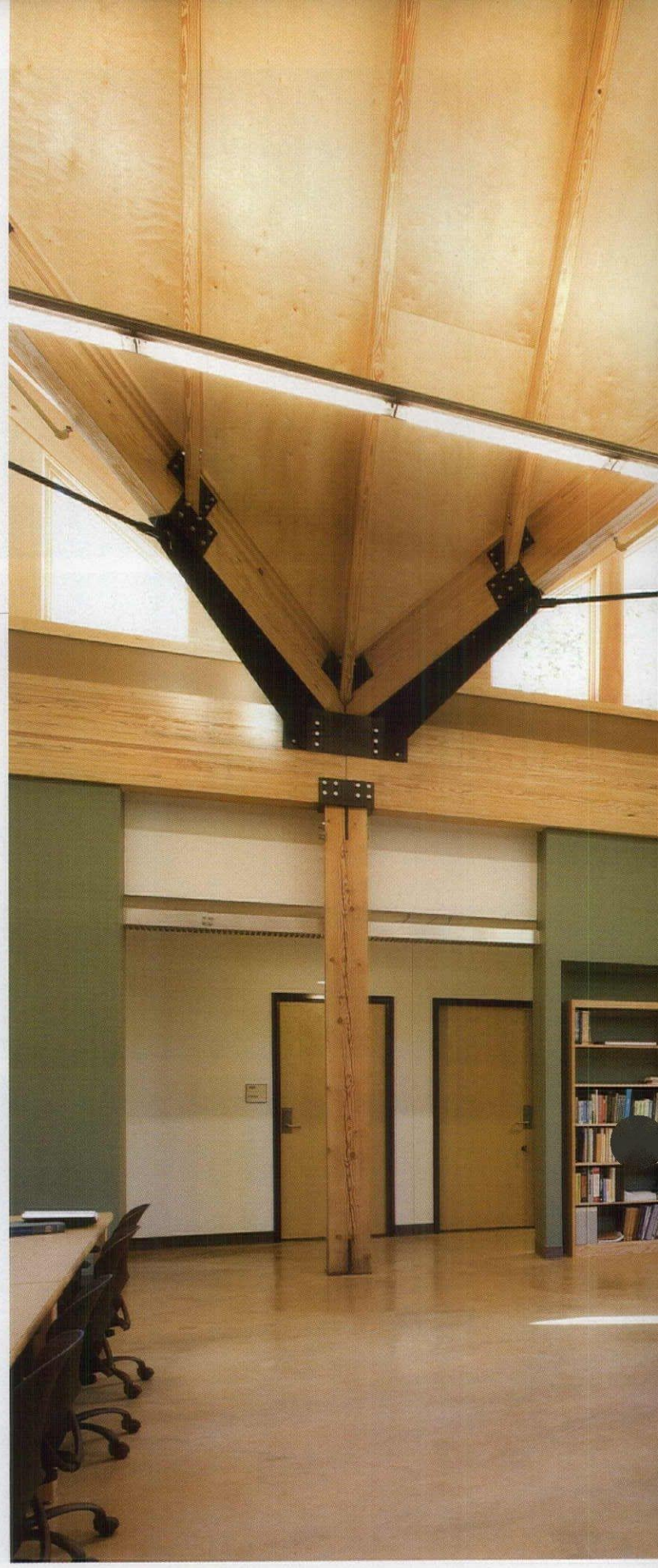
Olgyay collaborated on the lighting design with Atlanta-based architectural firm Lord, Aeck & Sargent, which designed the facility to accommodate changing research activities and foster collaboration among various groups—from biologists and ecologists to universities and museums. The center includes offices, curatorial storage, and laboratory space for park employees and visiting scientists and researchers. It also supplies space for Discover Life in America's All Taxa Biodiversity Inventory project, which seeks to categorize the park's estimated 100,000 species of living organisms.

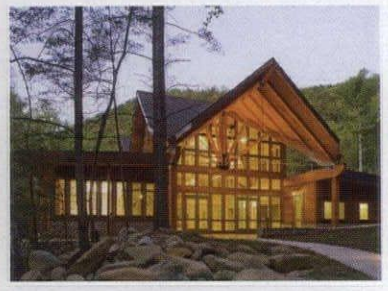
Jim Nicolow, who leads the sustainable design initiative at Lord, Aeck & Sargent, notes that one of the great things about this project is that the researchers and regional NPS staff all were involved in the early discussion of the design process. "It was a great educational opportunity for the whole team, and we were able to collaboratively identify the goals," he says.

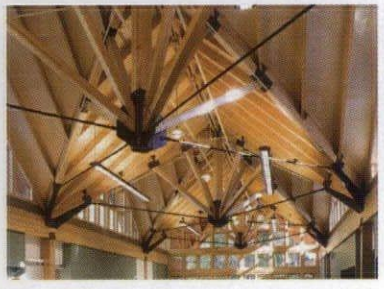
BUILDING BLOCKS

The NPS wanted Twin Creeks to have a mountain cabin aesthetic to go along with its natural wooded location near Gatlinburg, Tennessee. But at 15,000 square feet, Nicolow says, "That's a big mountain cabin. Coming up with a way to design it to have that feel was a challenge." The solution, he explains, was daylighting. Raising the building's center roof allowed daylight to illuminate the workspace from either side, but it also helped achieve the cabin look the client wanted.

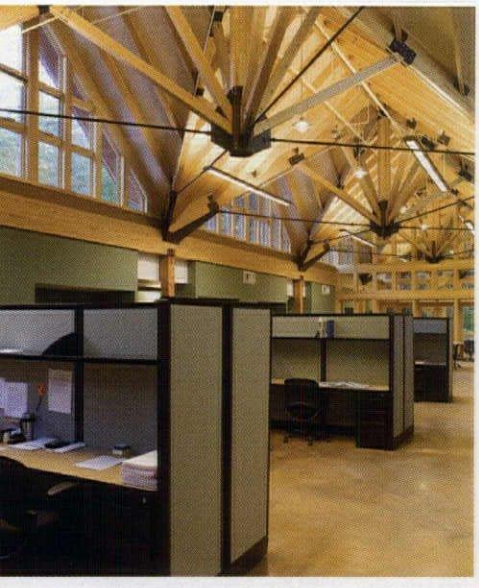
The building interior is split into three parts: a band of offices to the west, the workroom and classroom space in the center, and support spaces to the east, including a wet lab and curatorial storage area. Orientation is key in regard to daylighting, and Olgyay says that was a challenge on this project. "If the building was turned 90 degrees so its primary apertures were facing north and south, it would have been much easier," he explains. "But because of the site it had to face the way it did. That's why we had increased exterior overhangs and interior glare control, to ensure the daylight wouldn't interfere







The core of the Twin Creeks Science and Education Center features work and classroom space in an open setting for park employees and visiting scientists and researchers (left). The space was designed to be flexible so it easily could be reconfigured over time if necessary. The building uses a substantial amount of glass, which resulted in the architects and lighting designers paying careful attention to the electric lighting to ensure the facility did not disturb its natural surroundings when illuminated at night (above, top). The building's ceiling features a unique truss design (above).



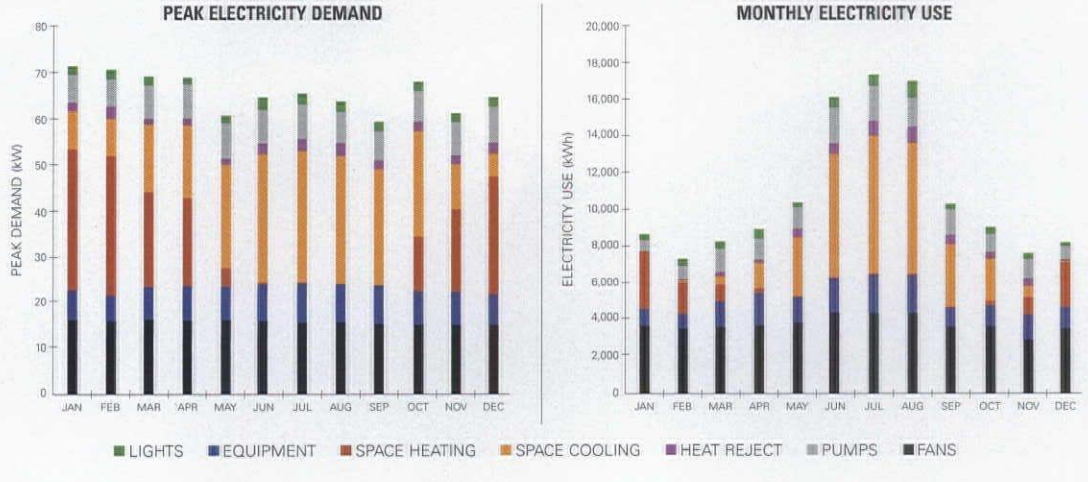
The research facility offers both workspace (above) and classroom space (right). Peak electricity demand and electricity use for the building is shown broken down by month (bottom right). Interior glare control for the building is shown in three-hour increments (facing page, top). Diagrams depict the shading for the building from south, east, north, and west (facing page, bottom).

DETAILS

PROJECT | Twin Creeks Science and Education Center, Great Smoky Mountains National Park, Tennessee
CLIENT | National Park Service
ARCHITECT | Lord, Aeck & Sargent, Atlanta
LIGHTING DESIGNER | Clanton & Associates, Boulder, Colorado
DAYLIGHTING AND ENERGY OPTIMIZATION | RMI/ENSAR Group, Boulder, Colorado
PROJECT SIZE | 15,000 square feet
LIGHTING COSTS | $4.5 million (construction); approximately $50,000 (lighting)
WATTS | .77 watts per square foot
PHOTOGRAPHER | Jonathan Hillyer, Atlanta
DAYLIGHTING STRATEGY | To develop the building section as a reverse-light fixture and introduce daylight into the building while understanding solar positions and designing to control glare.

MANUFACTURER | APPLICATION

ALERA LIGHTING | Office fluorescents
ARTEMIDE | Wall sconces in building corridors
BEGA | Exterior path lights
ELIPTIPAR | Wallwash in classroom
LAURALINE | Exterior wall lights and ornamental pendants in the central bay
LEVITON | Lighting control and dimming
LIGHTOLIER | Track lighting in the office corridor and mapping room
LUMIÈRE | Steplights for the exterior
METALUX | Utility fluorescents
PORTFOLIO | Downlights in the conference room
PRUDENTIAL | Fluorescent strip—direct/indirect in the central bay
SURE-LITES | Emergency and exit lights
WATT STOPPER | Occupancy sensors and timers



with the program needs." While the western orientation of the site was not ideal for daylighting, the architects and lighting designers relied on extensive solar analysis to ensure the building maximized its daylighting potential.

"We went ahead and tried to make all the interior surfaces into light-reflecting surfaces," Olgyay explains. "There was a lot of shading design, a lot of careful adjustment of the overhangs and specifics of the glazing to quantify the amount of light coming in so we could get the appropriate amount of light at times it could be most useful."

The project site years ago experienced a landslide that resulted in a mix of boulders ranging in size from footballs to Volkswagen Bugs, Nicolow says. Instead of building concrete walls around the site, the boulders were used as part of the sustainable design to create a retaining wall system. "We took one bad thing and turned it into a good thing," says Thomas Butler, staff architect at Lord, Aeck & Sargent. "It really integrates the site with the surroundings. It's a lot more natural."

Taking advantage of the building's wooded surroundings also helped in the daylighting strategy to diffuse the incoming light. "We were very conscious about limiting disturbance and cutting down trees to get the building in," Nicolow says. "There are trees all the way up to the building that will shade those windows and provide a benefit aside from looking nice."

The curatorial storage area is not daylit because it has strict humidity and temperature control requirements, Nicolow explains. Natural light would compromise the collections kept there; however, all of the general workspaces and offices have some access to daylight and view. The daylighting analysis performed for the building not only looked at the amount of light brought into the space but also the quality of that light, says Vikram Sami, daylighting specialist, project designer, and energy analyst at Lord, Aeck & Sargent. "Something I don't think is stressed enough is that the quality is as important as quantity," he adds, noting that glare and control are crucial because if the light is not controlled, "people use shades to block the light and you lose the opportunity for daylight."

Sami points out that because the human eye physiologically adjusts to the brightest spot in a room and looks at everything in comparison to that, it is important to be aware of a space's glare ratios. Throughout the day, sensors automatically dim the electric lights when adequate daylight is present. Occupancy sensors ensure that electric lights are not on unnecessarily. The building, especially in the main gallery space, primarily uses indirect electric lighting that is recessed into the architectural structure.

How to illuminate the building at night also was a challenge given the significant amount of glass used in the design. "You have to design any daylit facility to work without daylight," Nicolow says. "A lot of the [electric] light is directed down on the workspace. We didn't want it to be too much of a lantern. Outside, we used limited lighting at the parking lot, and the main entry path just has LED wayfinding lights—we don't light the area but just show where the sidewalk is." Keeping interior and exterior lighting to a minimum helps to not disturb the facility's natural surroundings. "You don't want to have any impact on the wildlife around it," Butler says.

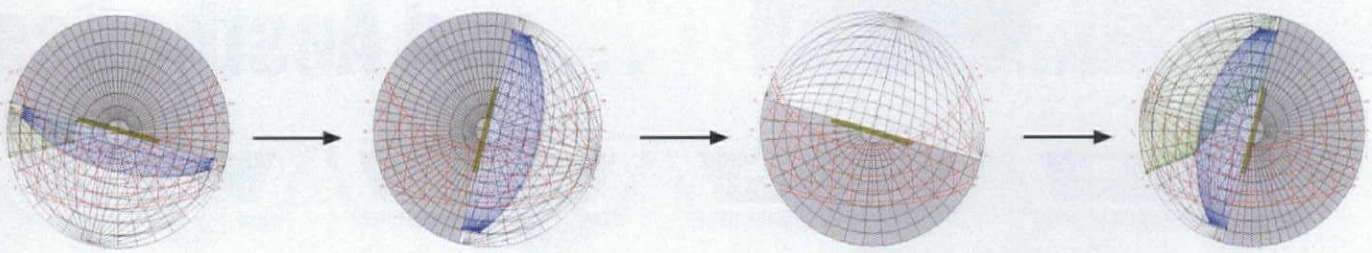
SUSTAINABLE STRATEGIES

The NPS from the beginning wanted a sustainable building design for Twin Creeks. Using the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) rating system as a guideline, the project features a host of sustainable design features, with the daylight harvesting analysis having the greatest impact on the overall building design.

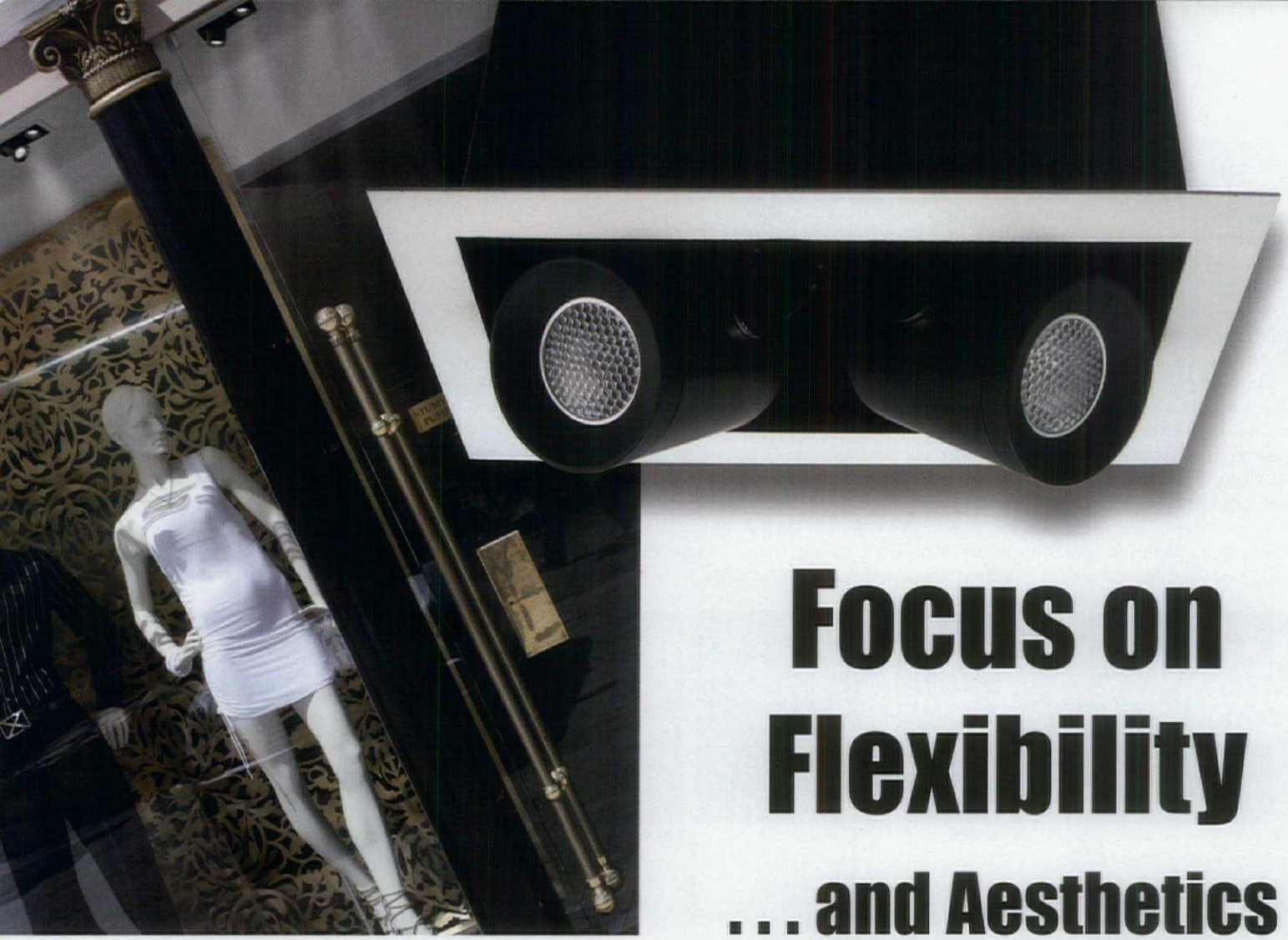
"If you can substitute electric light with daylight, you're not just reducing electric energy but also reducing the cooling load on the building," Sami explains. "Daylight is far more efficient in terms of watts per lumen. It's not a very high-cost item, and it really pays for itself in a short amount of time." He adds that many architects and lighting designers seem to have the misconception that working toward LEED certification is expensive, but in his experience he has found that LEED typically does not add much to the construction budget—less than 1 percent, he estimates, although he acknowledges that LEED does add to the consultant's budget.

Nicolow says this project pushed Lord, Aeck & Sargent in terms of qualitative analysis and daylight. The firm began working on Twin Creeks in 2001, and at the time was its first LEED project where LEED was part of the initial design process. The architects originally went about LEED in "the least effective way," he points out. "We used it like a checklist and kind of went credit by credit exhaustively. While we came out with a nice design in the end, we've since transitioned that approach, and we focus on big-picture designs first and then check the points." This project features a number of sustainable strategies aside from daylight harvesting, such as natural stormwater management, natural ventilation, and site-harvested stone masonry. Butler explains that when the outside temperature is in the "comfort zone," windows in the clerestories are set to open to naturally ventilate the building. The system is designed to close the windows when the outside temperature is below 45 degrees or above 65 degrees. As for stormwater management, instead of collecting or concentrating the roof and site runoff in pipes, Nicolow says they created "a series of cascading features that filter the runoff and encourage filtration."

Sami says that going after silver LEED certification helped the design process. "One of the things [LEED] addresses is integrated design, so what you're doing is you're creating a design solution that is more advanced, based on people talking to each other." As a result of the collaborative efforts of all involved, the NPS ended up with a research facility that utilizes a sustainable design heavily focused on daylighting that serves both the needs of the building and its occupants in harmony with its surroundings. **JENNIFER LASH**

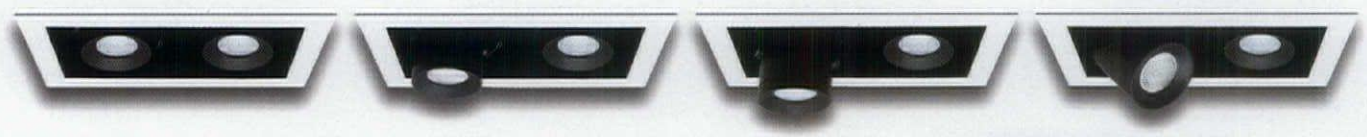


RENDERINGS AND TABLES PROVIDED BY LORD, AECK & SARGENT



Focus on Flexibility

...and Aesthetics



Revolutionary designed lighting head rotates, pivots and adjusts vertically for a variety of aiming positions.

Our New MiniFlex recessed accent fixture is designed to accommodate up to three low profile adjustable heads in a compact ceiling opening. High performance and excellent color rendering are delivered using the latest in ceramic metal halide lamp technologies, which includes the T4 GU6.5 and MR16 GX10 styles.

Companion products to the MiniFlex consist of round and square aperture downlights in narrow-to-wide beam distributions, wall washers and adjustable accents. A linear accent product that illuminates counter displays and jewelry cases is also available.

For more information on Pathway's complete product line, contact your sales representative.

Circle no. 28 or http://archlighting.com/productinfo

Individually adjustable, low profile (2-7/8" diameter) lighting heads rotate, pivot and retract or extend for a variety of aiming positions.

Brighten your bottom line with

PATHWAY®

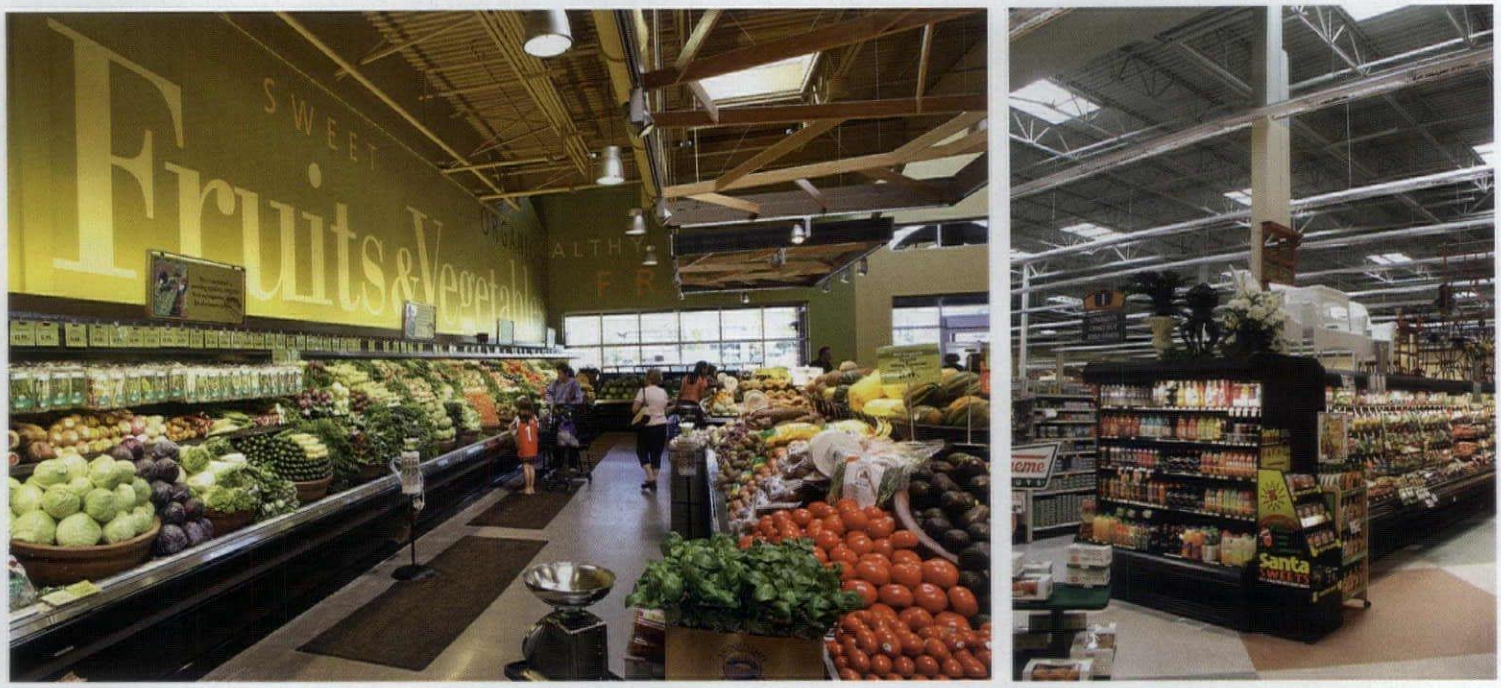
the Lighting Source

Pathway Lighting Products, Inc., Old Saybrook, CT 06475-0591
voice: 800.342.0592 • e-mail: sales@pathwaylighting.com • web: www.pathwaylighting.com

SUPERMARKETS, United States

STORES | Albertsons, Boise, Idaho; Puget Consumer Cooperative Natural Markets, Seattle; Stop & Shop, Quincy, Massachusetts **RESEARCH TEAM |** Heschong Mahone Group, Fair Oaks, California **DAYLIGHTING STRATEGIES |** Photocontrols to measure daylight levels and automatically adjust electric light output; natural light via skylights

CHALLENGE While roaming the supermarket aisles for bread, milk, eggs, and the like, many shoppers likely do not think twice about their surroundings. At stores across the country, however, customers might be noticing something different about their grocery trip, even if they cannot put their finger on the reason: daylighting. But how can grocery retailers successfully incorporate daylight into their stores—and, perhaps more importantly, why should they? Research over the past several years by the Fair Oaks, California–based Heschong Mahone Group studied the benefits of retail skylighting, and retailers currently employing these strategies are reaping the benefits.



The use of skylights in supermarkets can result in substantial energy savings as photocontrols automatically adjust the electric lighting when adequate daylight is present. In stores such as Puget Consumer Cooperative Natural Markets (left) and Albertsons (right), skylights are an integral part of the lighting design and offer an ambient environment.

PHOTOS COURTESTY PCC NATURAL MARKETS (LEFT) AND CHRISTOPHER MEEK (RIGHT)

SOLUTION "People don't think a lot about lighting in general," says Lisa Heschong, principal of Heschong Mahone Group, which provided the content and graphics for the *knowhow series* lighting design guide on retail skylighting, available at www.designlights.org/guides.html. However, while most customers might not realize that daylight is behind their improved shopping experience, Heschong adds, "They do make positive comments about increased visibility, how they're able to read fine print, and that they feel the stores are cleaner and more spacious. There's some sense of ambient conditions that they like." That also goes for the employees working in daylit stores. "The most significant benefit [of daylighting] is certainly in customer and staff satisfaction," says Lori Ross, director of store development for Seattle-based Puget Consumer Cooperative (PCC) Natural Markets. "Bringing the light inside is a great boost to the shopping and working environment. Daylighting creates a warmer, more intimate ambience."

Aside from the ambient environment it creates, daylighting in single-story retail stores (including smaller retailers such as PCC and big-box retailers such as Wal-Mart) can provide other benefits as well, the most popular likely being energy savings, particularly as building owners begin to fully understand the impact and benefits of sustainable design approaches. "In the push for low-energy, zero-energy buildings, we have to do daylighting to get there," Heschong says. "It's a fundamental component of any low-energy sustainable green design."

Depending on factors such as economics and climate, Heschong says that supermarkets generally can see an attractive payback from daylight harvesting, which uses photocontrols to measure daylight levels to automatically adjust the output of electric light levels. "Because grocery stores tend to have high light-levels and operate seven days a week during all daylit hours, that improves the equation for energy savings," she explains. Joel Loveland, director of the BetterBricks Integrated Design Lab in Seattle, started working in 1999 with the supermarket chain Albertsons, headquartered in Boise, Idaho. "They were concerned about the cost of skylights," he recalls. "They wanted to see the paybacks." By redesigning the roof systems, the amount saved on the cost of the steel structure was more than the cost of the skylights. "It's a great integrated design story," Loveland says. "When you look at things more holistically, really great high-performance ideas oftentimes have no cost premium."

It is not uncommon to have to make adjustments to energy-saving approaches to get the most out of them—it is part of the process of trial and error. Energy performance at one PCC store, Ross says, showed smaller savings than the company had expected. However, modifications regarding the electric lighting are being implemented at a store currently under construction, where Ross anticipates higher savings, with up to 40 percent wattage reduction.

Jim Blomberg, president of Sacramento, California-based Sunoptics Prismatic Skylights, says a skylight "is nothing more than a light bulb."

Skylights generally are seen as the primary way to bring daylight into a retail space, which means good things for Blomberg's company as it is involved with companies such as Kroger, Wal-Mart, and Food4Less. "If used properly, [skylights] will do great things for saving energy," he adds. Many architects will try to provide daylight through clerestories, sawtooth roofs, or other architectural forms, but Heschong says skylights are the most successful way to introduce daylight and make the most sense. One benefit she points out is that a horizontal skylight in a roof will let in more daylight than any other type of aperture. "On a cloudy day, you can have a skylight that's one-third the size of a window and letting in the same amount of light," Heschong says. "On a sunny day, you are able to take advantage of the sun, from sunrise to sunset, all year long. Whereas with a vertical window, clerestory, or sawtooth it has a distinct orientation. It will receive sun some hours of the day and exclude it other hours of the day."

Christopher Meek, daylighting specialist at the Seattle Integrated Design Lab, agrees with Heschong, pointing out that when conditions are overcast, the brightest part of the sky is directly overhead, making skylights a smart choice for supermarkets. "With the distance from one side of a store to the other, it's really impractical to bring in light from traditional windows," he explains. "It's important to deliver that light from above." Meek generally tries to design daylighting systems to provide about 60 percent of ambient lighting requirements during daylight hours. However, he notes that lighting power itself tends to be a small part of the energy-savings picture, which typically is the result of a combination of efforts. Jihad Rizkallah, vice president of design and engineering for Massachusetts-based Stop & Shop Supermarket Co., has discovered this over the years since first introducing daylight into Stop & Shop stores in 1999. "Daylighting was part of a holistic approach that included other energy-saving features such as more efficient refrigeration systems and more efficient HVAC systems," he says. "It wasn't just one thing [contributing to energy savings], it was all three."

When Stop & Shop installed skylights in the stores, Rizkallah recalls, the interior atmosphere became warmer. "Our older stores were lit using 400W metal halide fixtures, which were kind of harsh on your eyes," he explains. "Daylighting provides you with a comfortable environment, and the combination of daylighting and fluorescent provides you with that." About 80 to 90 Stop & Shop stores have skylights in them, featuring a daylight harvesting system that is used in conjunction with T5HO fluorescent lighting fixtures that can be dimmed down to 20 percent, Rizkallah says.

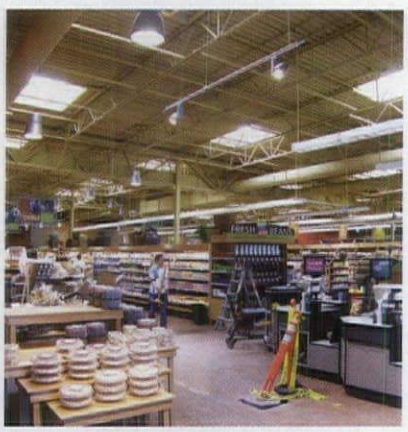
The Redmond, Washington, PCC store, which has achieved Leadership in Energy and Environmental Design (LEED) Gold certification, uses a three-step ambient light process that is triggered by light sensors on the skylights, Ross explains. The electric lights are either all on, half on, or all off based on the available daylight.

Electric lighting can be considered a cultural issue when it comes to retail, as Heschong points out that "in the past 50 or 60 years, we have come to expect that having the lights on means the store is open." For stores with visible luminaires, such as direct systems, she says that expectation is even greater. With cove lighting or indirect lighting systems, however, people cannot see the light source, so they do not have the expectation for the light to be on. According to Heschong, lighting designers need to think about what, other than the electric lights, could be the signal that says stores are open and operating.

To save both money and energy from installing skylights in a retail environment, control is essential. Automatic photocontrols will ensure that stores are maximizing daylight, and there is a choice between switching and dimming controls. Heschong explains that switching is "simple and less expensive" and in general tends to result in higher energy savings, while dimming is "more subtle, more sophisticated, and more expensive." She says switching is an attractive choice in retail because people move around while shopping, meaning their focus continuously is shifting and "they are less aware of discreet changes in light levels."

Loveland explains that the relationship between the location of the skylights and the type of product being sold on the retail floor is important. He says he tends to generously skylight the non-internally lit shelving while keeping skylights out of refrigerated areas with internal illumination so the skylights do not compete with the electric lighting. Skylights typically are used to illuminate the general sales floor, but it varies from retailer to retailer. While PCC and Stop & Shop primarily have skylights in the general merchandise areas, Heschong says she knows retailers who employ different strategies, such as one in the Southwest who swears by providing daylight over the produce section. "Their comment to me was that the produce sells so quickly, having higher light levels or worrying about spoilage is a non-issue for them." However, others avoid daylight over produce or flower displays because they worry the natural light will accelerate aging or blooming. Regardless of how many skylights are used or where they are located, "Make sure all sunlight is diffused," Heschong says. "Unfiltered sunlight is not a good idea."

As more supermarket chains across the country incorporate daylight into their stores, it appears to be a design strategy that will continue to be refined with time. And while the energy savings, customer satisfaction, and other benefits make the use of skylights in supermarkets worthwhile, Heschong says daylight also can be implemented as a creative design tool. "It is entirely possible to use daylighting as a strategic design element, to use it a little more artfully and as part of a visual merchandising strategy," Heschong explains. "I see that as the next frontier of daylighting, is getting the architects, lighting designers, and interior designers to all understand that they can use daylighting as an aesthetic component of design." **JENNIFER LASH**



The frozen foods section of a Food4Less store is shown illuminated by only daylight (above, left). Clerestory windows let in natural light and illuminate colored leaves hanging from the ceiling at the Redmond, Washington, PCC Natural Market location (above, center). The Redmond PCC store features 28 skylights that are specially glazed to block heat and diffuse the incoming daylight (above, right). Shoppers at an Albertsons store where illumination occurs by natural light via skylights with no electric lighting on (facing page).

PHOTOS COURTESY OF JIM BLOMBERG (LEFT), PCC NATURAL MARKETS (CENTER), ERIC STRANDBERG (RIGHT), AND CHRISTOPHER MEEK (FACING PAGE)


CAKE MIXES
BAGS & WRAPS
COOKING OILS

LET THE SUN SHINE IN

1. DRAPER | SKYLIGHT FLEXSHADE | DRAPERINC.COM
Installed directly into the skylight opening, Skylight FlexShades offer both solar and UV control. As long as rollers are level, the product can be installed at any angle, and a venting space between the shade and glass is recommended. Motorized or clutch operation is available with hardware finish choices of silver, black, white, ivory, or bronze enamel. CIRCLE 125

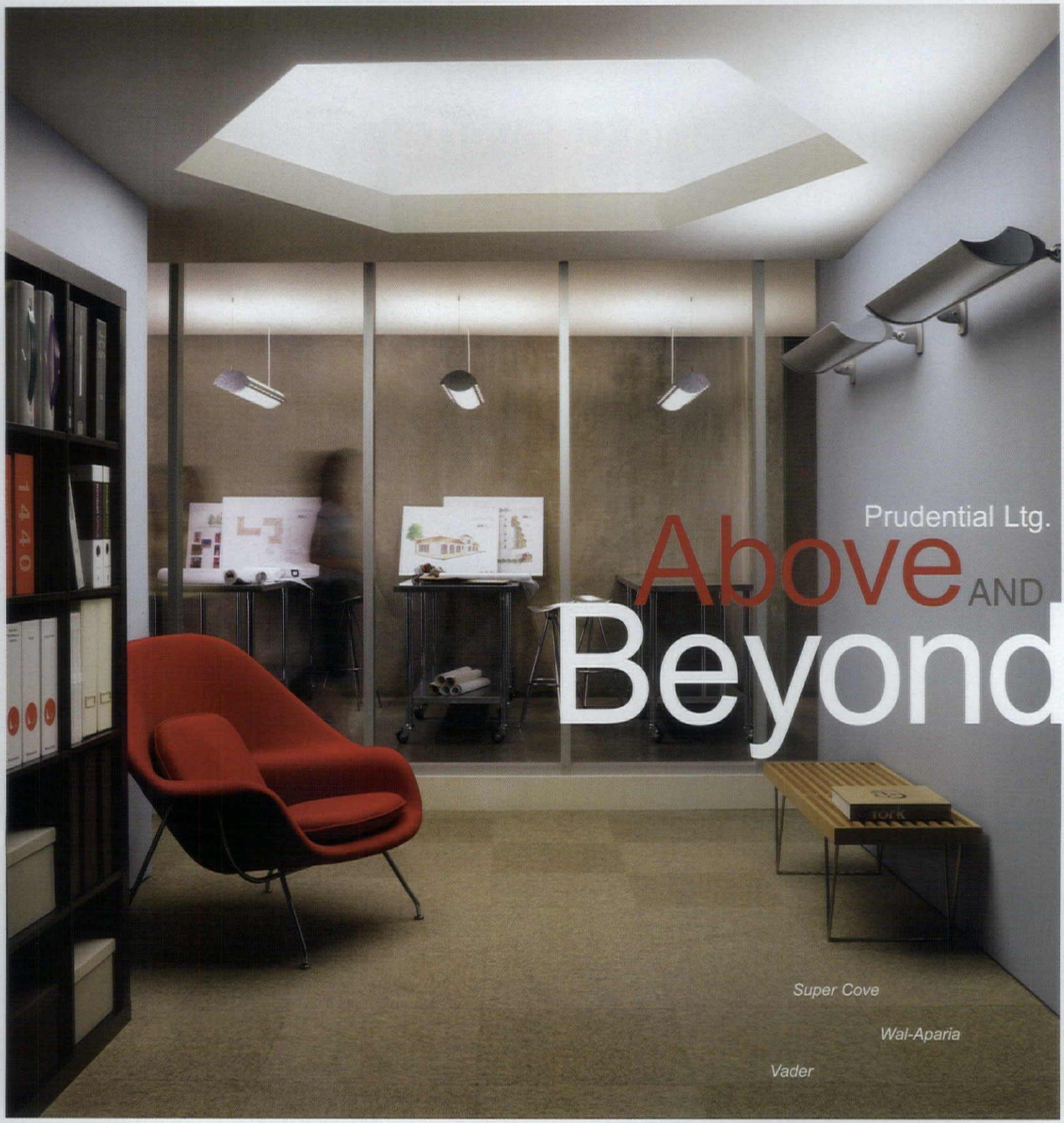
2. SOLATUBE | ZERO-TO-10-VOLT DAYLIGHT DIMMER | SOLATUBE.COM
Applicable for use in schools, offices, and hospitality facilities, this dimmer provides the option of integrating Solatube daylighting systems into existing lighting schemes. Its scene control allows the dimmer to automatically adjust the daylight for preset tasks while time-clock-based operation provides 24-hour light management. CIRCLE 126

3. ZUMTOBEL LIGHTING | RLLC | ZUMTOBEL.US
This Armstrong TechZone ceiling compatible luminaire is applicable for a variety of project types, including offices, retail, and institutional spaces. The Recessed Louver with Light Chamber (RLLC) has a matte white center louver and frosted acrylic side diffusers, allowing for individual or continuous row mounting. For use with T5 or T5HO lamps, a variety of panel options such as sprinklers, speakers, or MR16 downlights are available. More than 20,000 RLLC 5-foot luminaires with 6-inch panels are used in the Renzo Piano-designed New York Times headquarters building in New York City. CIRCLE 127

4. CIRALIGHT | SUNTRACKERONE | CIRALIGHT.COM
SunTrackerOne, according to the manufacturer, produces more than nine times more light than a passive skylight. It uses an array of three mirrors that reflect sunlight into the building. The system is self-powered, fully automated, and tracks the sun from an hour after sunrise to an hour before sunset. CIRCLE 128

5. ENOCEAN | STM110 SENSOR TRANSMITTER | ENOCEAN.COM
The STM 110 offers battery-free wireless lighting control technology, enables brightness sensors for dimming, and, according to the manufacturer, requires less than 19 footcandles to generate electricity. The power supply is provided by a small solar cell and the product can store energy for several days and function in total darkness. CIRCLE 129

6. NATURALITE SKYLIGHT SYSTEMS | N SERIES SKYLIGHTS | NATURALITE.COM
This line of skylights has been tested and is compliant with Section 2405.5 of the International Building Code. Extruded from recycled aluminum, it features optional thermal-break frames. Offered as single-, double-, or triple-glazed units, the skylight is available with either self-flashing or a curb mount. CIRCLE 130



{pushing the ceiling _ inside, out}

Specify fixtures from Prudential Ltg. and you'll get ceiling illumination that's soft and even. Our Vader is ideal for casting soft, even light across a low ceiling. Our Super Cove uses aluminum, galvanized steel, and painted steel to effectively deliver optical performance equal to any reflectors on the market. And our Wal-Aparia comes in a range of materials to expand the creative possibilities. See prulite.com for more ideas designed to lift the spirit of your space.

Circle no. 42 or
http://archlighting.com/productinfo

Light creates Life. Create with Prudential Ltg.

Mastering Sidelight, Part Two

DESIGNING FOR VIEW

IN "MASTERING SIDELIGHT," (APRIL/MAY 2007, P. 93–97) A METHODOLOGY FOR SIDELIGHTING WAS introduced along with a set of guidelines for relating sky view, aperture, and room. The present article follows with an in-depth discussion of how to design for an equally valuable interrelated resource—view. It describes how to separate the window into view and daylight function, then optimize for view by considering three fundamental physical properties of aperture: size, transmittance, and location.

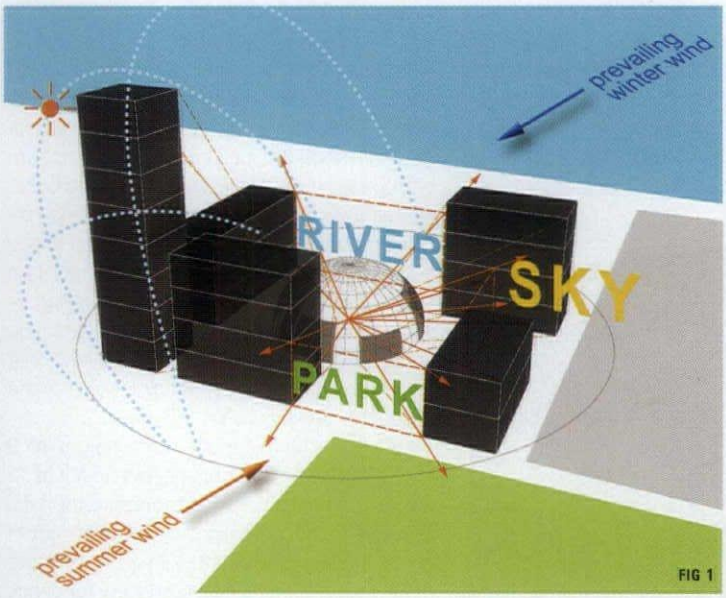


FIG 1

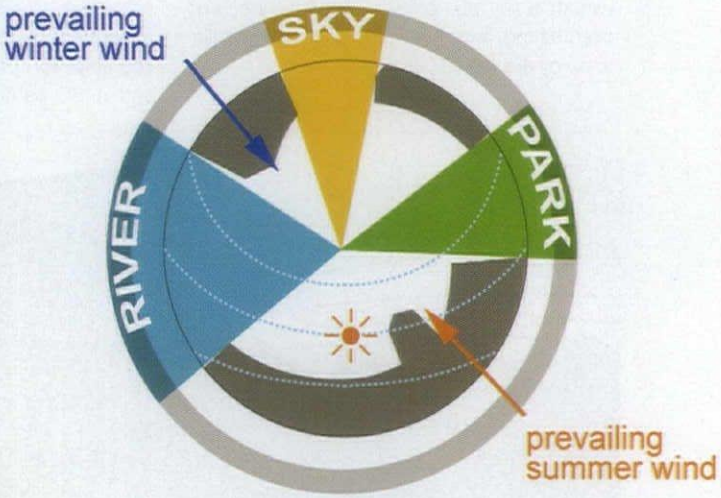


FIG 2

Figure 1 (above, left): A 3-D view analysis of an urban site. Primary view corridors are mapped along with overshadowing buildings, prevailing winds, and the annual sun path, allowing evaluation of the viewshed in context of other considerations present. Figure 2 (above, right): A 2-D view analysis of the same site, however, equidistant projection is used to map onto a flat plane to simplify its reading.

MINING THE VIEWSHED

Views are a distinct site amenity. Similar to a site's available daylight, a sustainable design effort needs to recognize and make use of views. Incorporation of local materials, such as stone or wood, not only reduces energy, but also imbues a project with an identity that is part of the local vernacular. The same concept can be applied to view. Identifying and hierarchizing a site's view corridors—natural and man-made, sky and earth, near and far—establishes a site's "viewshed." Implemented as a concurrent process with other energy flows from sun, wind, and light, it allows for planning of form and fenestration. *See Figures 1 and 2.*

VIEW VS. DAYLIGHT

Windows designed primarily for view do not provide adequate task illumination. Conversely, windows designed for daylight do not necessarily provide view; in fact, they often contribute some type of glare. The split window strategy presented in our earlier article addressed these conflicting functional requirements. *See Figure 3.* The approach has three basic steps: 1) separate the window into two parts; 2) optimize size and transmission for each function; and 3) locate the view window within the field of view, and the daylight window above the field of view near to the ceiling.

WINDOW PROPERTIES

To develop a deeper understanding of view function we will explore the interrelationships between three characteristic window aperture properties: size, transmission, and location.

Window Size

Window size is measured in relation to wall area and described by the window-to-wall ratio (WWR). There is a minimum size for a window to provide adequate view, just as there is a minimum size for a window to provide adequate light. The main difference is that the threshold size for view is based on the viewer rather than the wall. To maintain a certain angular area, the aperture needs to increase in size as the viewer moves further from the window wall. According to the British Standard Daylight Code, for a distance less than approximately 25 feet, a minimum .20 WWR is required, and for a distance greater than approximately 50 feet, a minimum .35 WWR is required. *See Figure 4.* Several studies over the past few decades have shown that the majority of people find windows sized to a WWR above about .30 provide sufficient view. It is important to note that exceeding these thresholds to enhance view can become problematic unless specific attention is

ILLUSTRATIONS BY VICKY PANG, TANTERI + ASSOCIATES

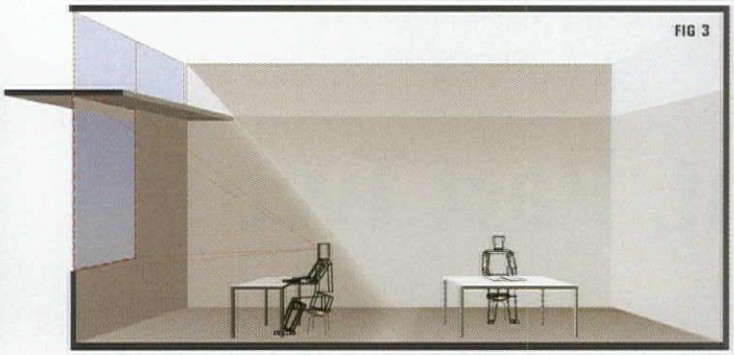


FIG 3

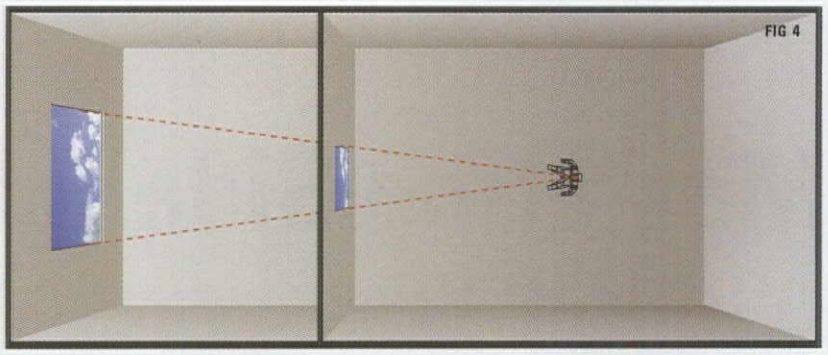


FIG 4

paid to glazing thermal properties. Large glazed areas may admit excessive solar heat gain during the cooling period, and lose heat during the heating period. The radiant and thermal effect of large glass areas also can cause discomfort for occupants seated near windows in the form of drafts, chills, and overheating, and thwart the occupant's ability to enjoy available view.

overcast sky. For these reasons, as a general rule, lower VT glazing is more acceptable in clear or partly cloudy sky conditions, and higher VT glazing in overcast conditions. *See Figure 5.* In RP-5-99 IESNA Recommended Practice of Daylighting, a related study is cited where, for spectrally neutral glass, the majority of people found a 38 percent VT acceptable for predominantly overcast skies and a 32 percent VT acceptable for clear skies. Keeping in mind the basic concept of light sunglasses for overcast skies and dark sunglasses for clear skies, this range can be extended slightly in each direction. During partly cloudy sky conditions, the area of the sky opposite the sun can have excessive luminance levels requiring low-end of acceptable VT. Views toward the North (in the Northern Hemisphere) of high-reflectance buildings under similar sky conditions also may call for a similar solution. It is critical to understand that adjusting glazing VT to allow view of direct sun is not possible since it would prohibit all views. Another factor to consider is the location of high-VT and low-VT apertures within the same field of view as the juxtaposition allows comparison and may affect the acceptability of the lower VT.

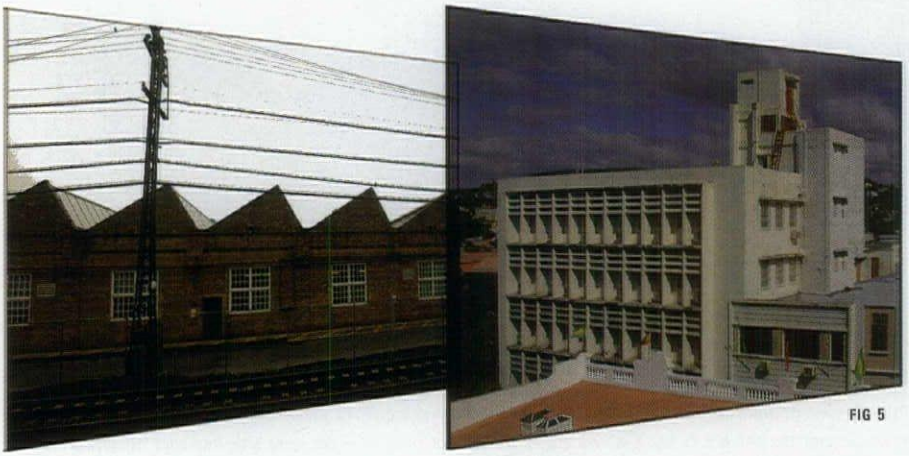


FIG 5

Figure 3 (top, left): This generic room illustrates the split window strategy, which separates and balances view and daylight function. Figure 4 (top, right): In this plan view, an occupant looks through a 20 percent WWR placed 25 feet away and another wall twice the distance with a 35 percent WWR, yet sees an image with the same apparent size. Figure 5 (above): An example, on the right, of low-VT glazing used for a high luminance partly cloudy sky and light building surface. On the left is a medium-VT glazing used for a low luminance overcast sky and dark building surface.

Visible Transmittance

Visible transmittance (VT) is a percentage of visible energy admitted and measures glazing transmission. The minimum acceptable VT to provide adequate view can be keyed to the window wall's cardinal orientation and the predominant sky condition: overcast, clear, or partly cloudy. The three sky conditions have different characteristic ranges of illuminances and sky ground brightness relationships. Under an overcast sky, the ground typically is darker than the sky and the exterior illumination level is low. Under a clear or partly cloudy sky condition, the ground typically is brighter than the sky and the illumination levels are two to 10 times higher than an

Location

A window's view frame can be deconstructed into three layers: sky, horizon, and earth. The sky, located toward the upper part of the wall above eye-level, shows distant background. The horizon, located at eye-level, shows midground. The earth, located toward the bottom of the wall below eye-level, shows foreground. Not all view frames incorporate all three elements; some may include just one of these components. The interpretation of view is a subjective phenomenon, but a compelling visual conclusion, illustrated in the example shown, is that views with all three layers, or at least two, may be the most satisfying for the occupant. *See Figure 6A, 6B, and 6C.*

Consider a minimum room height of 9 feet, a minimum daylight window height of 18 inches optimally placed at the top of the window wall, and a daylight penetration depth twice the daylight window head height; the datum separating daylight and view functions falls at approximately 7 feet 6 inches above finished floor (AFF). This offers some logic behind the manual calculation method option for the Leadership in Energy and Environmental Design's (LEED) Indoor Environmental Quality Daylighting credit 8.1 that considers any window area below 7 feet 6 inches AFF (down to 2 feet 6 inches AFF) to be noneffective for daylighting and designated for view purposes only. *See Figure 7.*

THE WINDOW IN BALANCE

Daylighting also depends on aperture size and transmission, but unlike the fixed nature of these properties for view function, the relationship is inverse.

Total daylight admission depends on effective aperture (EA), the product of WWR and VT. The three windows in *Figure 8A, 8B, and 8C* all have the same EA, so they admit equal quantities of daylight into the room. The top room's window has no glazing, so it has a VT of 100 percent. The bottom room's window fills the entire wall, so its WWR is 1.0. To keep the EA constant in each room, aperture VT is

ILLUSTRATIONS BY VICKY PANG, TANTERI + ASSOCIATES

Bright Ideas, Bold Innovations

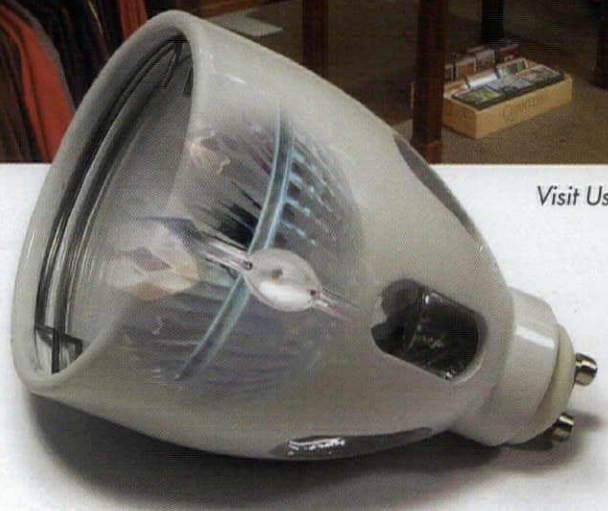
A Brighter Idea
Than Incandescent

Case Study: Golf Pro-Shop in Northeastern Ohio

(30) R30 65 Watt incandescent track lighting fixtures were replaced with
(18) Venture's Performance Plus™ MR16 35 Watt electronic pulse start systems

- **60% Reduction in Energy Usage**

Visit Us at LightFair: Booth 1227



- 6x the light output
- 6x the life
- CRI of 90+

From VENTURE® LIGHTING

For More Information, Call or Download the Brochure:

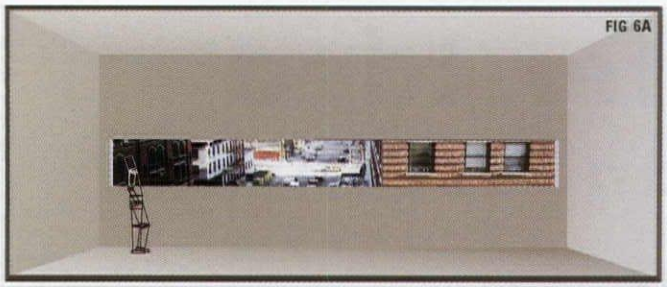
800-451-2606

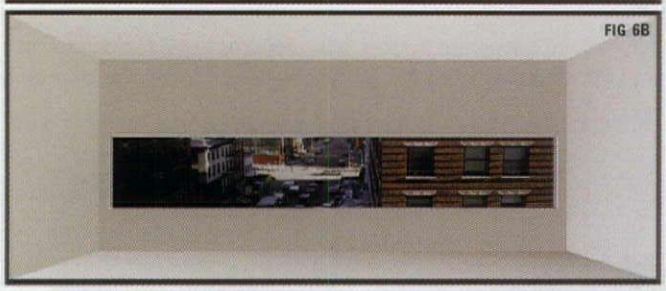
FAX: 800-451-2605 E-MAIL: venture@adlt.com

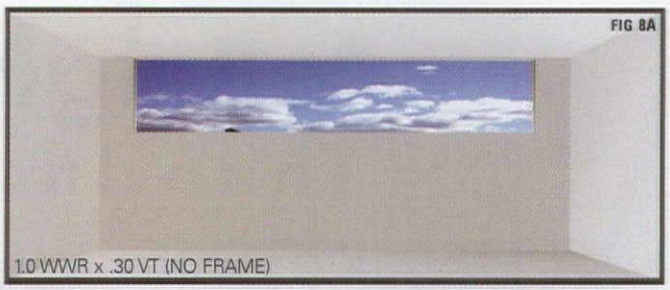
VentureLighting.com/PerformancePlus

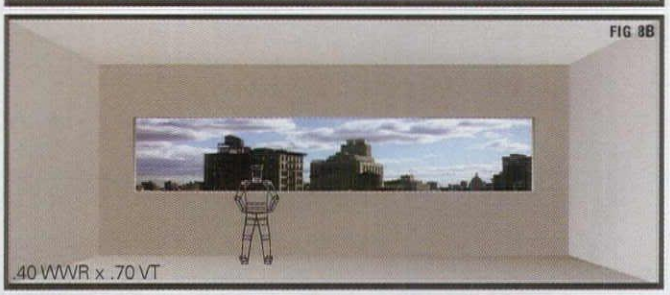
Circle no. 70 or http://archlighting.com/productinfo

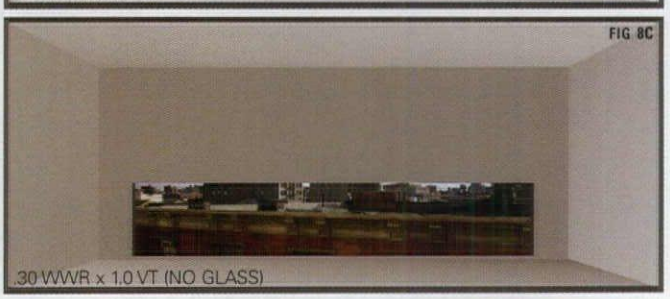
VLI-0912A1-0208

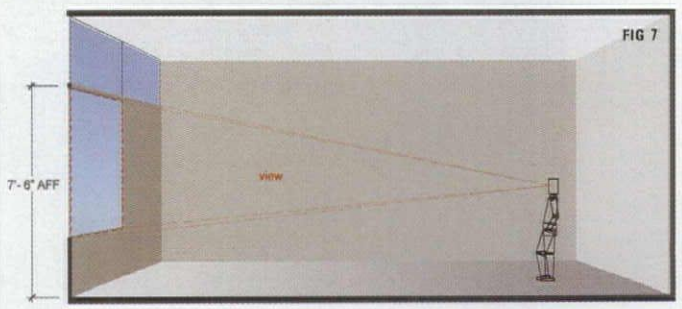












Figures 6A, 6B, and 6C (top, left): Window wall with variable height aperture framing views of sky (6A), horizon (6B), and earth (6C). Figure 7 (above): To balance the separate functions of daylight and view, the daylight window is positioned above eye-level, and the view window is centered at eye-level and below. Figures 8A, 8B, and 8C (top, right): In each of these three rooms all window apertures have the same effective aperture.

increased or decreased in inverse relation to the WWR. The middle room's window (.40 WWR x .70 VT) represents a typical window that tries to balance daylight and view. The WWR is .40, just below the maximum value allowed in U.S. energy codes using the prescriptive method—meaning criteria are described, as opposed to the performance method where compliance is based on gathered data. The VT is 70 percent, representing a neutral color high-performance glazing on a clear low-iron (less green tint) substrate.

Our example should help with understanding the intent of the manual glazing factor calculation method LEED offers to achieve daylighting credit 8.1. As part of this calculation, any window with a VT below 70 percent is to be considered for view purposes only, and it requires the area of the window to be considered for daylighting to be above a 7 foot 6 inch datum and have a minimum VT of 70 percent. In other words, using glazing with a fixed VT, it is difficult to get one window to do it all. **MATTHEW TANTERI**

ILLUSTRATIONS BY VICKY PANG, TANTERI + ASSOCIATES

GEEK IS GOOD

2008 R+D AWARDS

CALL FOR ENTRIES

NEW TECHNOLOGIES ARE REVOLUTIONIZING THE PROCESS AND PRODUCT OF ARCHITECTURE. TO CELEBRATE THE LATEST ADVANCES IN BUILDING SCIENCE, **ARCHITECT** PROUDLY ANNOUNCES THE SECOND ANNUAL R+D AWARDS AND SUMMIT. THE AWARDS HONOR INNOVATIVE MATERIALS AND SYSTEMS AT EVERY SCALE—FROM HVAC AND STRUCTURAL SYSTEMS TO CURTAIN-WALL AND CEILING-PANEL ASSEMBLIES TO DISCRETE MATERIALS SUCH AS WOOD COMPOSITES AND TEXTILES. THE R+D AWARDS ARE PURPOSEFULLY OPEN TO BUILDING TECHNOLOGIES OF ALL TYPES, IN ORDER TO ENCOURAGE THE BROADEST POSSIBLE DIALOGUE AMONG ARCHITECTS, ENGINEERS, MANUFACTURERS, RESEARCHERS, STUDENTS, AND DESIGNERS OF ALL DISCIPLINES.

ELIGIBILITY
The awards are equally open to architects, designers of all disciplines, engineers, manufacturers, researchers, and students.

CATEGORIES
The awards will be judged in three categories, reflecting different stages of the research and development process. You can find a full description of categories at www.architectmagazine.com

PUBLICATION
The winning entries will appear in the August 2008 issue of ARCHITECT, both in print and online.

EVENT
Winners will present their ideas at the **R+D Summit**, which will occur at **SCI-Arc** in **Los Angeles** in **September, 2008**. For more information about the event, visit www.architectmagazine.com or email rdawards@architectmagazine.com

DEADLINE
Thursday, May 29, 2008
regular submission deadline (postmark)

Monday, June 2, 2008
late submission deadline (postmark, additional fee is required)

FEE
Subscribers: $100 first entry

Non-subscribers: $140 first entry (includes a one-year subscription to ARCHITECT)

Additional entries: $75 each

Late entries: $50 additional fee per entry by June 2, 2008

PAPERWORK
Application forms and submission requirements are available for download in PDF format at www.architectmagazine.com

FOR MORE INFORMATION EMAIL:
RDAWARDS@ARCHITECTMAGAZINE.COM

LIGHTING TO SUPPLEMENT NATURE

Daylight Harvesting Interior Architectural Lighting

ALERA LIGHTING

Aesthetics. Performance. Selection. Value.
We are architectural fluorescent lighting.

Circle no. 85 or
http://archlighting.com/productinfo

www.aleralighting.com

HUBBELL
HUBBELL LIGHTING INC.

Lighting's Latest Nuts and Bolts

LIGHTING DESIGN STARTS WITH KNOWING WHAT THE GEAR CAN LET YOU DO. ESPECIALLY with the increasing emphasis on energy efficiency and sustainable design, even small improvements in tried and true products might mean the difference in a Leadership in Energy and Environmental Design (LEED) point or two. These days just one point can make the lighting designer or electrical engineer a real LEEDing hero, not to mention the energy savings and other benefits to the client.

However, among those who provide the less glamorous lighting efficiency, retrofit and maintenance, some of the products are essential elements of everyday work. Specialists in this part of our field live for a 2-watt savings on every lamp, and you can bet with rising energy prices that providers of energy efficiency will be busy for many years to come. These products often are critical in giving them the edge over competitors who are not quite up to speed.

In preparing this, I have surveyed the product introductions and innovations throughout the industry in the past couple of years that I consider really important. I do not mean to offend a company who introduced the most beautiful incandescent lamp or dimmer because while appearance obviously is important, to me it is innovations that affect the way I make major decisions.

Lutron's latest offering in its Grafik Eye family—the QS—offers combined lighting and shade control (left). GE's line of HIR Plus lamps (inset) can be used for both interior and exterior applications. According to the manufacturer, the HIR-coated filament tube nearly eliminates UV-B and UV-C radiation helping to reduce fading and discoloration of displays.

PHOTOS COURTESY OF LUTRON (LEFT) AND GE (INSET)

LAMPS

Let us start by admitting that light-emitting diodes (LEDs) generally are not lamps like we know them. We need an entirely new way of evaluating LED systems. (Architectural Lighting will discuss this topic in its upcoming LED Supplement to coincide with the April/May 2008 issue.) But there are a few exceptions in which an LED product fits into a conventional socket and basically works like a regular lamp. Of the products I have seen, the ones that genuinely jazz me are the medium-based and GU24 R-lamp products. They tell an important story—while the LED is small, the heat sync is big. As long as you have the room for an R40-sized lamp, you can now get a 10W to 12W, 50-plus lumen per watt, 2700K LED that honestly competes with the 65W incandescent R-lamp it is intended to replace.

Surprisingly, there are still incandescent lamp developments. The majority of them are variations of infrared reflecting PAR lamps that reduce watts while maintaining roughly the same beamspread and intensity of common products. For instance, 48W lamps can be used where 60W lamps were the original design. For retailers with a large investment in PAR lighting systems, this is a good alternative before succumbing to metal halide. Another impressive product is the aluminum-reflector 300W halogen PAR56, a noteworthy improvement over regular incandescent versions. I also was pleasantly surprised by the 20W PAR36 for landscape lighting, which allows for subtly beautiful landscapes.

One very special tungsten development is the 18,000-hour MR16. I like MR16s for applications such as elevators and outdoor steplighting, and these lamps are ideal for these and other applications where lamp maintenance is a major issue.

Among fluorescent lamps, the most impressive new products are conventional T8 lamps that can achieve up to 46,000 hours rated life on a programmed-start ballast. Also having very high efficacy, these lamps might cause you to reconsider using LED or other ultra-long life but expensive lamps like induction. In addition, almost all popular T8 lamps are available with a color rendering index (CRI) of

80-plus, high lumen 2700K and 5000K as well as the more common 3000K, 3500K, and 4100K lamps. We are still waiting for the 2700K T5 but at least we can get the rest of the range, including 3000K, 3500K, 4100K, and 5000K lamps. You can even get a 6500K lamp if a project demands it. In the mainstream lamp market, T8 lamps are

- PAR compact fluorescent lamps
- PAR ceramic metal halide lamps
- Various shapes of cold cathode lamps

I find these products fun and useful when trying to reduce energy use for a number of unusual situations. For example, replace

LED Lighting Fixture's LR6 downlight module (above) can be installed in most standard 6-inch recessed incandescent or non-incandescent housings. According to the manufacturer, this converter lamp provides a light output of 650 lumens and has a color rendering index of 92.

available in 25W and 28W energy-saving products from just about every lamp manufacturer, and one company has introduced a new generation of ultra-low mercury products. There also are, finally, high-lumen lamps in the important and often overlooked lengths of two feet and three feet.

Being an energy-efficiency freak, my favorite lamps are T5, and the big deal is the "super" T5. These lamps have 3,050 initial lumens, 10 percent more light per watt than regular T5, pushing the source to more than 100 lumens per watt. Another group of new low-energy T5 and T5HO lamps generate the standard lumen output with lower watts; imagine saving 3 watts per T5HO lamp just by using a different lamp. There also is the amalgam T5HO; this is a lamp that maintains its high lumens per watt over a wider range of temperature than a regular T5HO lamp. Think about gyms, skating rinks, and other applications where the lighting system operates over a wide range of ambient temperature and this might be ideal.

Among lamps, my new favorites still tend to be ceramic metal halide. Lamps are available from 20W to 400W and in a wide variety of envelopes including MR16, PAR20-64, ED17-28, double-ended R7, and even the exotic AR111. We have gotten pretty used to these lamps, but recently a new T9 250W lamp caught my attention. This is the first of a generation of ceramic lamps over 150W with universal burning position, which happens to be a rare and useful product. There also are some new 90-plus CRI ceramic metal halide lamps with great color, which are promoted wisely for retail lighting.

I cannot leave lamps without mentioning the veritable plethora of medium screw-based products. While we are overwhelmed by cheap compact fluorescent lamps, take a look at these not-so-ordinary lamps:

- MR16 lamps with integral transformer

incandescent marquee lamps with cold cathode; they can be dimmed and flashed without shortening their life. I like the MR16 converters in homes and other situations where a narrow beam of light was the perfect replacement for an R-lamp's blob of light.

BALLASTS

It is amazing that ballast manufacturers are able to accomplish energy savings from already-efficient systems, but they do. Among fluorescent ballasts that stand out, efficient versions of just about all T8 and T5 lamps are now available. There also are efficient ballasts for T5 twin tube lamps achieving nearly 100 lumens per watt that may make 2-foot-long luminaires a good choice instead of linear lamp fixtures. Several companies also have developed high-efficiency ballasts for the 2-foot lamps, something we need to make better use of, particularly for F17T8 and F14T5 lamps.

I also noticed that new generation efficient ballasts are now available for 8-foot T8 lamps. This is important: the 8-foot T8 lamp is now just as efficient as the 4-foot super T8 and offers the full range of ballast factors, too. Start thinking about going back to the 8-foot lamp in low-bay commercial applications where the T5 is too bright and the limitations of HID are a problem.

Perhaps the most exciting ballast-related development is that efficient dimming ballasts are now available. Until recently, dimming ballasts for a T5 or T8 lamp required 25 percent more lighting power than nondimming ballasts, but with the exception of California's Title 24, no energy code credit was given, effectively discouraging the use of dimming ballasts. The new dimming ballasts are about as efficient as regular nondimming ballasts. Versions in 0–10 volt, 3-wire analog, 2-wire analog, and digital addressable lighting interface (DALI) are now available.

PHOTO COURTESY OF LED LIGHTING FIXTURES

Beta LED delivers...

THE EDGE™

Sentry Equipment,Oconomowoc,Wisconsin

beta LED™

THE EDGE™ reduces CO_2 emissions by 19% over HPS

Be environmentally friendly, eliminate mercury waste, reduce greenhouse gas emissions, and use less energy with THE EDGE by Beta LED

To download case studies and learn more, visit www.betaLED.com or contact your Beta Lighting Rep.

Circle no. 69 or http://archlighting.com/productinfo

Beta Lighting • p. 800-236-6800 • www.betaled.com

Outside the United States, THE EDGE™ products are sold through Ruud Lighting

HID electronic ballasts also are a big story. Major developments in low-wattage ceramic metal halide include smaller and more efficient ballasts, ballasts that can sense and operate multiple lamp wattages, and ballasts with heated thermal protectors allowing recessed uses including incandescent (IC) housings. For the higher wattage lamps over 150W, electronic ballasts are the way to go for indoor HID lighting, and many of the versions allow limited range dimming as well as easier interfacing of auxiliary lamps, daylight sensors, motion sensors, and other modern control devices. The most important story about HID ballasts, however, is cost; thanks to volume and competition, prices are dropping on HID electronic ballasts, making their use cost justified in most of the country.

Another intriguing development among ballasts is multilevel and step dimming products. They offer simple, low-cost controllability for a price point somewhere between nondimming and dimming equipment. With energy codes requiring multilevel lighting, these are smart options to achieve level controls without the ugly partial switching solutions we have been using for so long. Stepping ballasts are now available with the high efficiency technology of "super" ballasts, making them excellent choices for most lighting applications where full range dimming is not needed.

Universal Lighting Technologies' Ballastar light-level switching for T8 lamps (left) switches from full light to 50 percent power using standard wall switches or relays. Osram Sylvania's QUICKTRONIC metal halide ballasts (right) extend lamp life, improves lumen maintenance, and eliminates lamp cycling.

CONTROLS

The biggest news in all of lighting, other than LEDs, is the evolution of controls. As mentioned earlier there have been some wonderful and appealing new products for dimming of incandescent lamps and other loads applying conventional technology and design approach. I am more focused on the evolution of behind-the-scenes technology, and there is a lot going on.

At the top of the list is the maturation of digital lighting controls. The promise of DALI is now being realized as manufacturers finally have developed whole lighting systems that are easy to install and inexpensive to commission. Keeping in mind that DALI is a minimum starting point, these products include proprietary enhancements that make all the difference in applicability. For instance, ballasts provide power and connect photosensors, motion sensors, and manual controls to the system and thus dramatically reduce the cost of installing state-of-the-art controls. I am especially happy to see PDA-based setup and whole-building management software.

Next on my list is daylight systems integration. As we design more advanced buildings, we are going to need to control blinds, skylights, and other active sun control systems with electric lights. Once as simple as using a photoelectric controller, systems that permit user control over shades can now be very complex to integrate active solar, electric lighting, and audio visual functions. Both digital systems and normal preset lighting control systems now enable shading systems to be part of user-selectable scenes.

Finally, there is the ongoing revolution in wireless lighting controls. At the consumer level, this appears to be the year of Z-wave technology for homes. Costing slightly more than existing X-10 equipment, the Z-wave Alliance has more than 125 manufacturers making compatible products. At the commercial and professional level, existing wireless systems are starting to be challenged by Z-wave and Zigbee mesh network systems, with the threat of making wireless control cheap and easy to retrofit to existing buildings.

SUMMARY

Excluding LEDs, we likely can expect a continuing decline in the number of lamp and ballast developments as LED lighting systems are now reaching efficacy and efficiency levels suited for general lighting. But LED systems will remain expensive, and until we are prepared to pay 10 cents per lumen for our lighting gear, conventional lamps will still be popular.

Controls, on the other hand, offer a new dimension to energy efficiency. Too many buildings have been written off as uncontrollable because of the high cost of retrofitting high-performance controls. Developers of mesh networks and other wireless systems know that cost-effective wireless controls will be a huge business as the need to control lighting becomes essential. In new buildings, I personally like the reliability of wiring, and digital lighting systems using DALI and related technologies. They are the only way to build buildings in the future. **JAMES R. BENYA**

PHOTOS COURTESY OF UNIVERSAL LIGHTING TECHNOLOGIES (LEFT) AND OSRAM SYLVANIA (RIGHT)

A|L LIGHT & ARCHITECTURE design awards

Architectural Lighting Magazine announces the FIFTH ANNUAL A|L LIGHT & ARCHITECTURE DESIGN AWARDS honoring outstanding and innovative projects in the field of architectural lighting design. The A|L DESIGN AWARDS recognize and reward excellent lighting design within the specific criteria relevant to each category (Residential, Interior, and Exterior). To acknowledge issues of notable importance in today's practice of lighting design, and design techniques particular to lighting, Architectural Lighting also presents a series of awards that recognize Best Use of Color, Best Incorporation of Daylight, and Best Lighting Design on a Budget. Winning projects are published in the July/August 2008 issue of Architectural Lighting and featured on www.archlighting.com.

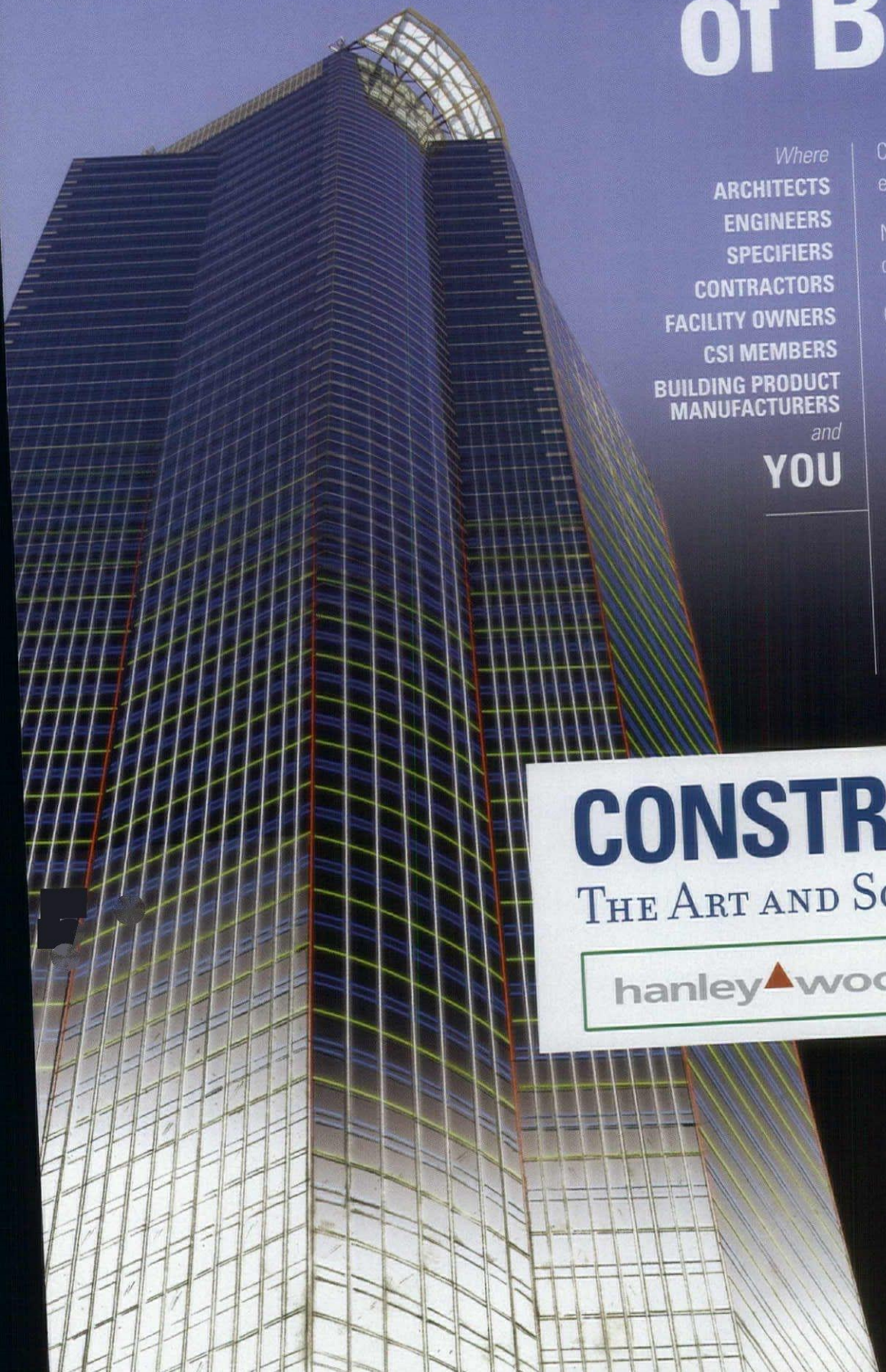
ENTRY DEADLINE: MAY 22, 2008

Late Entry: June 6, 2008

Forms will be available **January 2008** at www.archlighting.com

Questions? **Elizabeth Donoff,**

The Art and Science of Building



Where
ARCHITECTS
ENGINEERS
SPECIFIERS
CONTRACTORS
FACILITY OWNERS
CSI MEMBERS
BUILDING PRODUCT MANUFACTURERS
and
YOU

Choose from over 100 expert-led educational sessions.

Network with peers in the engineering, contracting and architectural fields.

Check out the latest products, information and services from hundreds of building product manufacturers.

Participate in the CSI Annual Convention and attend the numerous educational and social events.

Join thousands of commercial, industrial, and institutional construction professionals and hundreds of exhibiting companies as they come together to interact, discover and increase business.

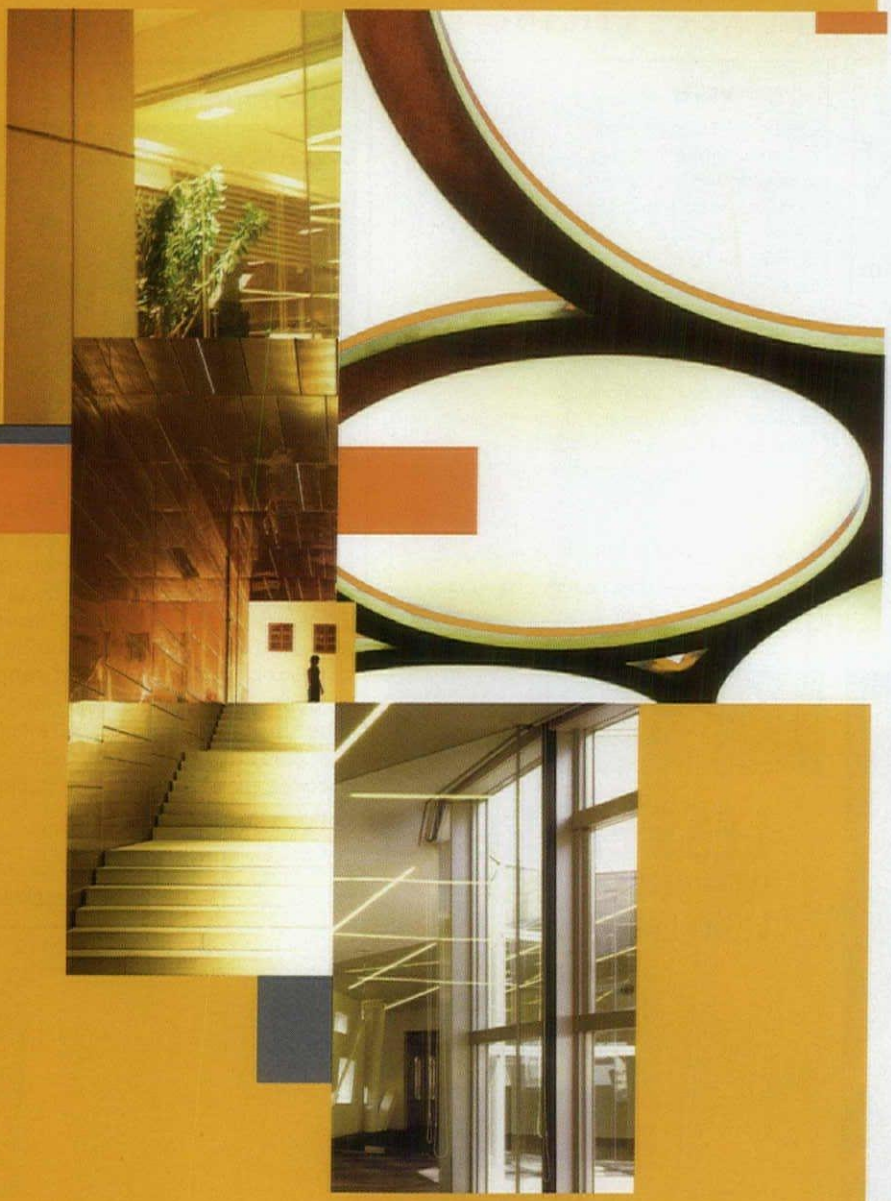
CONSTRUCT 2008

THE ART AND SCIENCE OF BUILDIN

hanley▲wood SPONSORED BY CSI

EDUCATION: June 3-6, 200
EXHIBITS: June 4-6, 2008
Las Vegas Convention Cente
Las Vegas Nevada, USA

Register online **NOW** at
www.**construct**show.com



2008 LIGHTFAIR® INTERNATIONAL

The future. Illuminated.

Trade Show & Conference
Wednesday, May 28 –
Friday, May 30, 2008

LIGHTFAIR Daylighting Institute®
Monday, May 26 –
Tuesday, May 27, 2008

LIGHTFAIR Institute℠
Monday, May 26 –
Tuesday, May 27, 2008

Las Vegas Convention Center
Las Vegas, NV

www.lightfair.com

At LFI, the future is GREEN.

WHAT BETTER PLACE TO **SHINE** THAN LAS VEGAS?

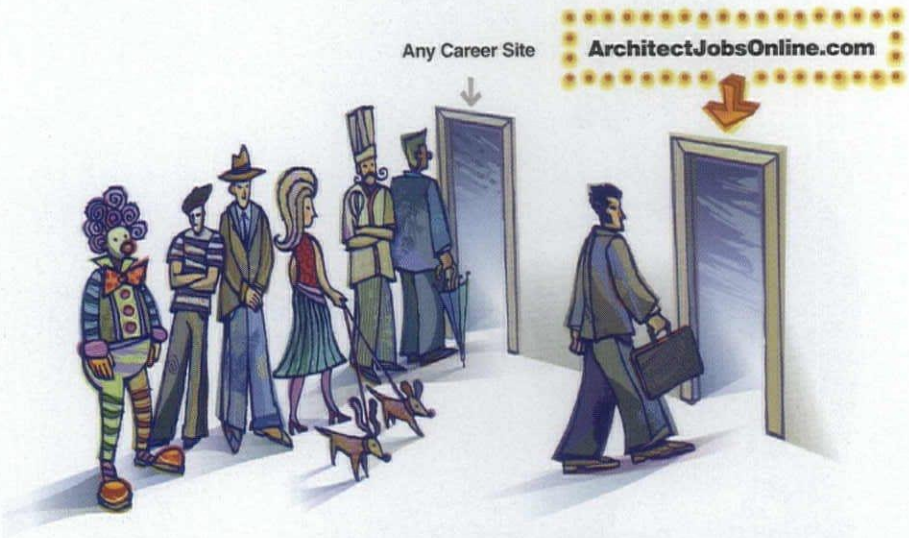
Only the world's largest architectural and commercial lighting showcase can compete with all that glitters in Las Vegas – **LIGHTFAIR INTERNATIONAL 2008.**

Circle no. 51 or
http://archlighting.com/productinfo

TRAVEL: For guaranteed hotel discounts call 888.325.9373 (U.S. & Canada) or 1.404.584.7458 (International). For AirTran Airways and Delta Air Lines savings, visit Lightfair.com. ©2007 AMC, Inc.

PHOTO CREDITS (CLOCKWISE): 01 – 02 DESIGNERS: Abdi Ahsan | COMPANY: Kondominium Taman Anggrek | PHOTOGRAPHY: Abdi Ahsan
03 DESIGNERS: Reiko Chikada, Sachi Takanaga | COMPANY: Chikada Design | PHOTOGRAPHY: Hiroshi Ueda & Shinkenchiku-sya Co., Ltd.
04 DESIGNERS: Gerd Pfarré, Katja Moebs | COMPANY: Pfarré Lighting Design Studio | PHOTOGRAPHY: Stefan Mueller-Naumann, Munich

IALD — Sponsored by The International Association of Lighting Designers
IES — Sponsored by The Illuminating Engineering Society of North America
AMC — Produced & Managed by AMC, Inc.
LD+A — Official On-Site Event Directory



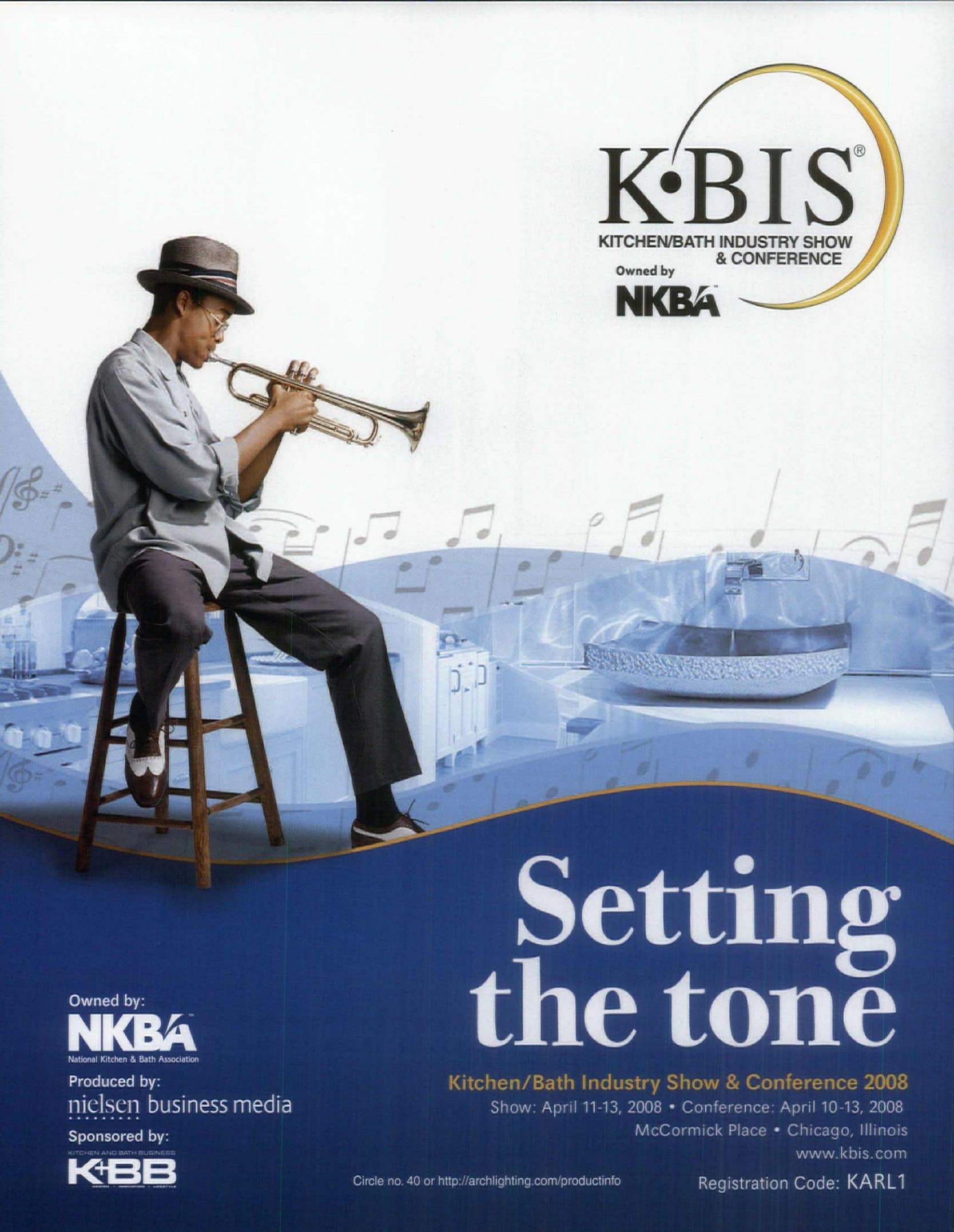
Get out of the crowd, and into a job. At ArchitectJobsOnline.com.

To advance your career in commercial or landscape architecture or CAD design, you need to look where the jobs are: ArchitectJobsOnline.com. We're the official career site of ARCHITECT and *residential architect* magazines. Which means all our job listings are in your industry, from the highest concentration of architects available online. Unlike general job sites, we offer exclusive industry content that helps you research prospective employers, plus valuable career advice and nationwide salary comparisons. So visit ArchitectJobsOnline.com today. And leave the mass market job sites to those other characters.

ARCHITECTJOBSONLINE

• • • Job Listings • E-mail Alerts • Career Tools • Industry Intelligence • • •

hanley▲wood


K·BIS®
KITCHEN/BATH INDUSTRY SHOW
& CONFERENCE
Owned by
NKBA
Setting the tone
Owned by:
NKBA
National Kitchen & Bath Association
Produced by:
nielsen business media
Sponsored by:
KITCHEN AND BATH BUSINESS
K+BB
Kitchen/Bath Industry Show & Conference 2008
Show: April 11-13, 2008 • Conference: April 10-13, 2008
McCormick Place • Chicago, Illinois
www.kbis.com
Circle no. 40 or http://archlighting.com/productinfo
Registration Code: KARL1

DEADLINE: March 3, 2008

CALL FOR SUBMISSIONS

2008 Lightfair Market Issue Product Guide

Architectural Lighting Magazine invites you to forward new product information for editorial consideration in our June 2008 Lightfair Market Issue Product Guide. Submitted products should have been released since June 2007. This annual special issue showcases more than 200 products in 15 product categories.

Product Categories

- Daylighting and Solar Controls
- Decorative
- Downlights
- Emergency
- Fiber Optics
- Indirect and Direct/Indirect
- Industrial
- Lamps, Ballasts, and Controls
- LEDs
- Outdoor and Landscape
- Software
- Specialty
- Task
- Theatrical
- Track

Material Submission Requirements:

- All artwork must be 300 dpi and at least 4" x 6" or the closest approximation. Appropriate file types are Photoshop TIFF, EPS, or PSD and should be formatted for a Mac. There should be no text on the images; that information should be included in the printout. Please label the digital images using the following format: "Manufacturer_Product Name".
- Color printout of digital image(s).
- Include the submitter's name, address, phone number, and e-mail address on the color printout. Also label the printout using the naming format above.
- Printout of product description.
- Include a press release with information about the product(s) as well as a technical spec sheet with the product details. Also include the submitter's name,address, phone number, and e-mail address on the product description page.

Product submissions must include the following:

- Submitter's contact information
- Product information sheet
- Disc with images in correct format
- Color printout of images

Please send materials to: Elizabeth Donoff, Editor, Architectural Lighting Magazine, Hanley Wood Magazines, One Thomas Circle NW, Suite 600, Washington, DC 20005-5811

Please note: Submissions cannot be accepted electronically.

Daylighting Required?

As sustainable issues such as energy efficiency and quality environments permeate the design process, one particular topic—daylighting—is at the fore of many a "green" discussion. With daylighting strategies being implemented in so many of today's buildings, the question is: Are we ready to require buildings in the United States to be daylit? And if so, what are the implications? **Replies can be submitted to edonoff@hanleywood.com.**

DENISE FONG | PRINCIPAL | **CANDELA**

This is an interesting question and could be answered on many different levels. There's the architectural level, which would require the proportions of buildings to change; floor plates generally would need to be narrower than we typically build today, and ceilings would need to be higher. We would need daylight glazing in addition to view glazing. Exterior shading devices would need to be the norm rather than the exception. Orienting a building to optimize it for daylight is a challenge for many sites and may not even be possible in many dense urban cities. It would require changes to zoning regulations, requiring more slender towers with more space between them. There is considerable cost to these elements from a developer's point of view.

Effective daylighting also requires higher quality, more sophisticated controls to allow the electric lighting to work effectively in concert with the daylight. Code requirements for automatic daylight controls will create the market demand necessary for high quality affordable control products.

In Europe, to be considered a Class A building it must be daylit and have natural ventilation. These two criteria drive the design of the building envelope. The precedent is there. The question is can we accept the challenge? Like many sustainable strategies, seeing examples of others who have done it successfully gives encouragement to the masses. I would like to see broadly available incentives rather than requirements for building envelopes to provide better daylighting. Controls could be developed more rapidly with code requirements.

JEFFREY T. BERG AND JOHN L. POWELL | PRINCIPALS | **PB**

Requiring buildings to be daylit would improve our luminous environments and, if properly detailed, save energy. The basic tools to evaluate daylighting in buildings have been available for decades. We would have to design carefully to avoid glare and overheating. It would be critical to coordinate zoning requirements, allow adequate views of the sky, and control massing, setbacks, and floor depths with respect to the exterior wall to maximize utilization. For example, some European codes require that every worker have direct access to daylight. This virtually eliminates both the continuous band of perimeter private offices and the massive floor plates of corporate headquarters.

NEALL DIGERT | VICE PRESIDENT OF COMMERCIAL DEVELOPMENT | **SOLATUBE INTERNATIONAL**

Unequivocally, YES. Aggressive use of daylight in buildings has been required by other industrialized countries for decades. Recent scientific research has found that access to daylight is key to how humans function, both physically and psychologically, and as such, we now know that we (the design community) are doing a disservice to our population if we don't aggressively apply daylight as a building standard. The use of daylight for interior illumination leads to decreased absenteeism, increased productivity, improved student test scores, increased retail sales, increased property values, reduced environmental pollution...the list goes on.

As visual beings, daylight is the perfect illuminant, but issues stemming from old daylighting design techniques have prevented daylighting from being easily and successfully applied in U.S. buildings—until now. Daylighting technologies now provide substantially greater daylight collection and better delivery systems, as well as sophisticated electric lighting control technologies, making daylight as easy to apply as electric lighting in most instances, and sometimes even easier.

California already has begun the process of daylighting mandates through its Title 24 energy codes, requiring the use of daylight technologies and controls in certain commercial building space types. The process must be launched carefully on a larger scale, ensuring that codes and requirements provide up-to-date language that embraces new technologies. All too often, codes focus on the old "tried and true" methods, blocking the appropriate use of innovative new technologies. Widespread adoption for daylighting is right around the corner. It's about time.

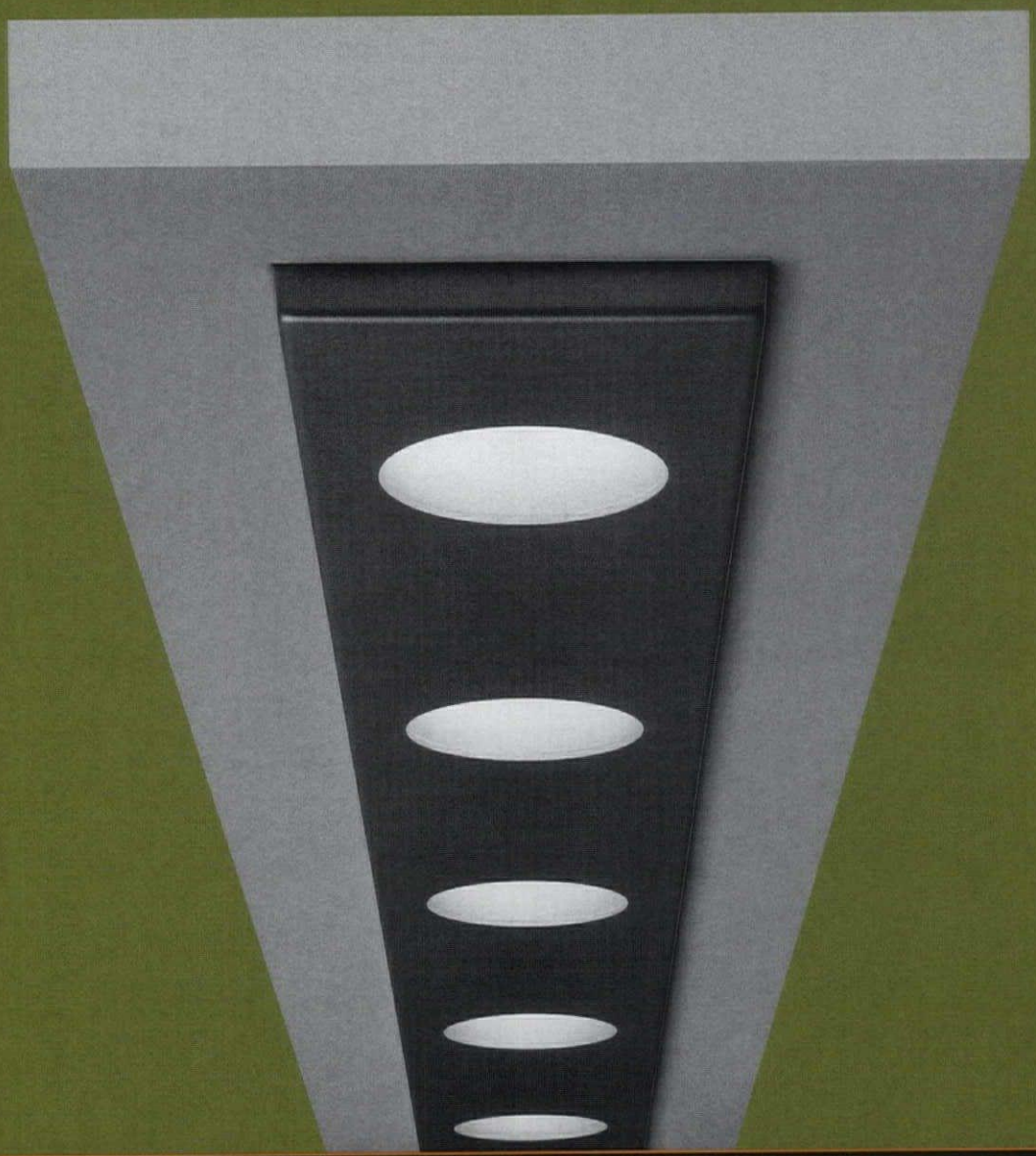
NANCY CLANTON | PRINCIPAL | **CLANTON & ASSOCIATES**

YES! Daylighted buildings not only reduce our dependence on energy, but provide beauty and enjoyment of interior spaces. For years research has shown the advantages of daylight on people's well-being. Heschong Mahone Group has shown increased student test scores in daylighted classrooms, increased sales in daylighted retail stores, and productivity increases for office workers with quality views of the outside. Judith Heerwagen in her paper "Investing In People: The Social Benefits of Sustainable Design" states improved health outcomes including well-being, less stress, improved cognitive performance, and improved work and life satisfaction when building designs incorporate a connection to nature and incorporation of daylight and sunlight in buildings.

We have all experienced our preference for daylighted rooms with quality views. Integrating the electric lighting to respond to the daylight will provide further benefits in reducing energy use.

It has been only since the 1970s when buildings were not designed with daylight. Poor glazing options led to the attitude that windows resulted in more energy usage. Now with superior glazing options, windows once again can be incorporated into low-energy buildings.

- Instigate mandatory daylighting design education for all architects, engineers, and interior designers.
- Provide more research on the advantages of views and daylight for healthier and productive interior spaces.
- Develop daylighting metrics that outline design decisions for quality daylighted spaces. Metric ideas may include establishing maximum and minimum luminance levels and ratios on all interior surfaces; defining quality views; understanding overcast and sunny condition variations and diurnal effects; and analyzing direct sun penetration advantages or disadvantages.
- All designs should incorporate daylight design decisions into the other building systems' design such as electric lighting and HVAC.
- Commission all building systems to optimize the daylight potential.



BRUNO®

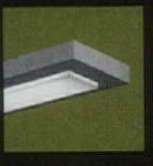
{now available}


sleek


simple


playful


understated


pure

Circle no. 32 or http://archlighting.com/productinfo

PEERLESS®

peerless-lighting.com

LUTRON®

VIERTI™

SINGLE-TOUCH DIMMER

LED Display: White, Green, or Blue Models.
Architectural Wallplate: 10 Colors, 11 Metal Finishes.
Circle no. 37 or http://archlighting.com/productinfo

INFO: 1.888.LUTRON1 | WWW.LUTRON.COM/VIERTI