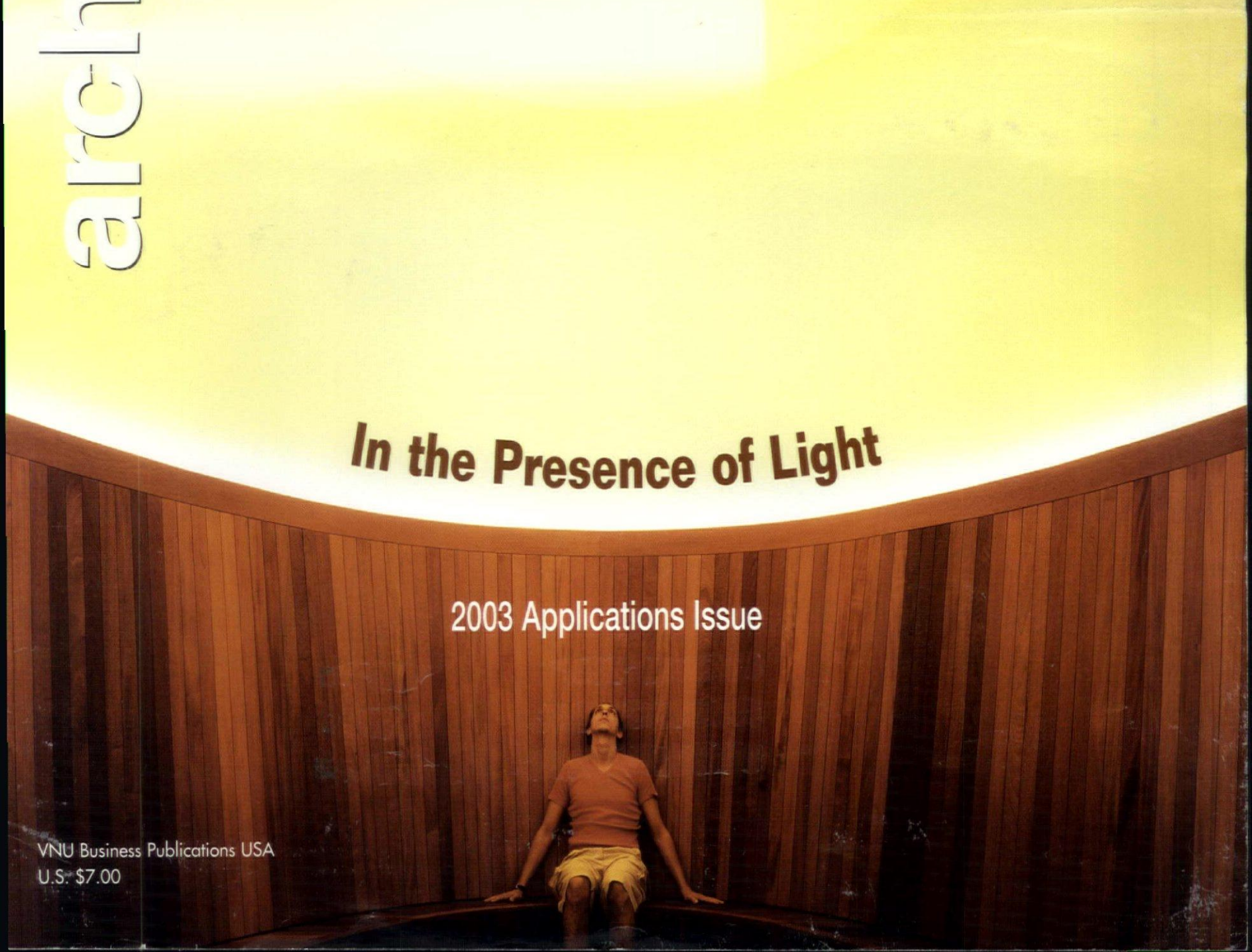
AL-2003-09-10

SEPTEMBER/
OCTOBER
2003

architectural lighting

In the Presence of Light

2003 Applications Issue



VNU Business Publications USA
U.S. $7.00

Remember when this was all you had to know about energy efficiency?

These days, energy efficiency is a critical consideration in any lighting installation. SYLVANIA has products that can help you squeeze every possible lumen out of every energy dollar. With high efficacy METALARC® metal halide lamps, energy saving DULUX® compact fluorescents and OCTRON® T8 fluorescents, and high performance CAPSYLITE IR® halogen PAR lamps, SYLVANIA offers more energy saving options than anybody.

SEE THE WORLD IN A NEW LIGHT **SYLVANIA**

Circle No. 38 on reader service card

Call 1/800-LIGHTBULB, your SYLVANIA representative, or visit www.sylvania.com.

Ultra Reflective, Super Effective, Highly Selective.

The fastest, easiest way to reduce lighting costs is with Alanod®, America's leading supplier of enhanced reflective surfaces. For the past five years, Alanod has developed most of the new energy-efficient surfaces in the lighting industry. That's why so many professionals specify Alanod for retrofit as well as new projects.

MIRO, with 95% total reflectivity, is our most innovative and efficient reflective surface. Compared with anodized aluminum, MIRO yields more light to your working plane. And producing more light with less energy means significant cost savings–savings that extend beyond energy to fewer ballasts, tubes and fixtures.

Only MIRO has unique characteristics that give it greater total reflectivity and far better optical control than any other surface in the industry. For light distribution patterns and optical effects, Alanod offers a broad range of MIRO surfaces, affording the lighting engineer unlimited design options. So directing light where you want it is within your control.

MIRO has a 25-year warranty against surface deterioration. And unlike other surfaces, MIRO won't delaminate, yellow, darken, blister or crack.

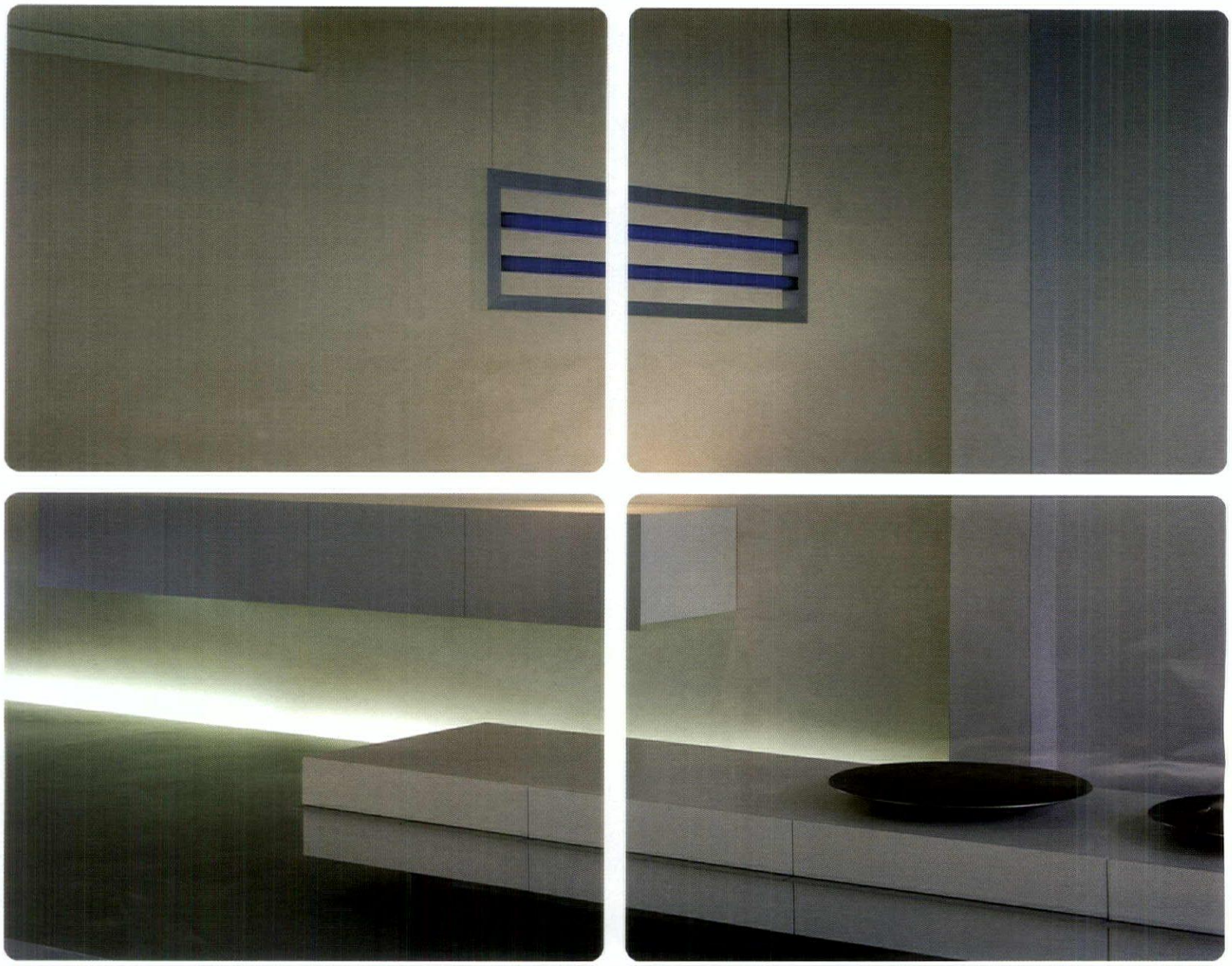
Specify MIRO, the leading edge in lighting technology

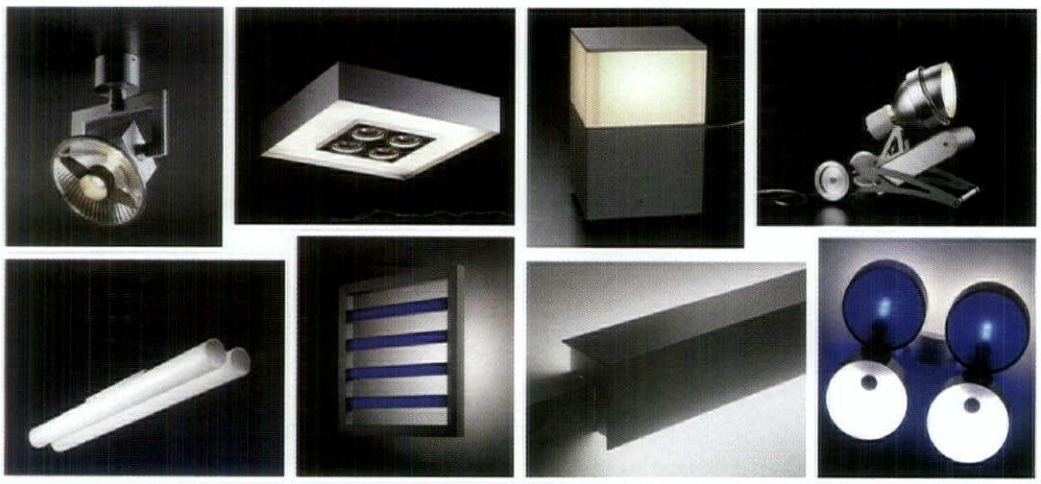
alanod®

MIRO® The fastest, easiest way to reduce lighting costs

Eastern US Sales: 718-321-0002 • Western US Sales: 208-726-3003 • Canada Sales: 905-840-6868 • www.alanod.com

Circle No. 2 on reader service card





INTRODUCING THE NEW COLLECTION
FOR THE LIGHTING BIBLE V CATALOG
AVAILABLE NOW IN PRINT OR CD

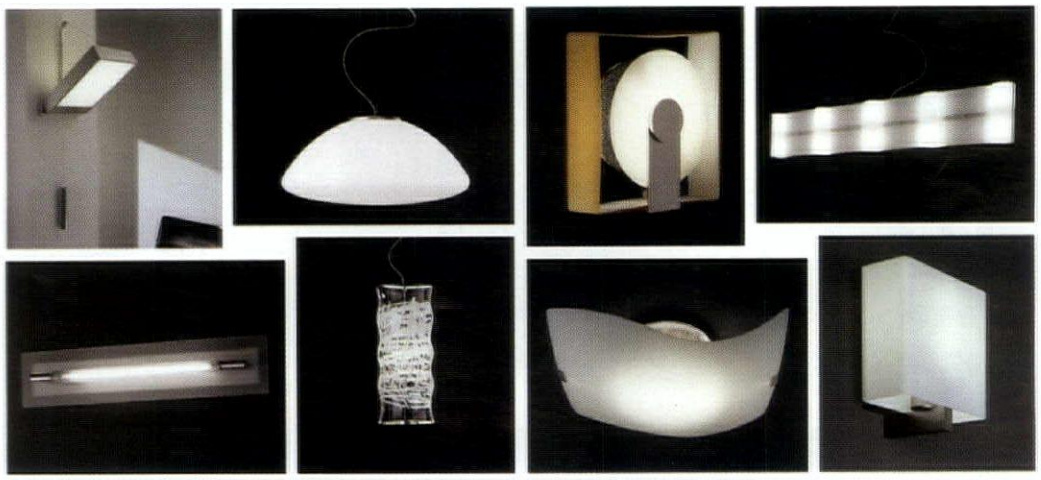
FAD
LIGHTING

DELTALIGHT USA
THE BRIGHT SIDE OF LIGHT

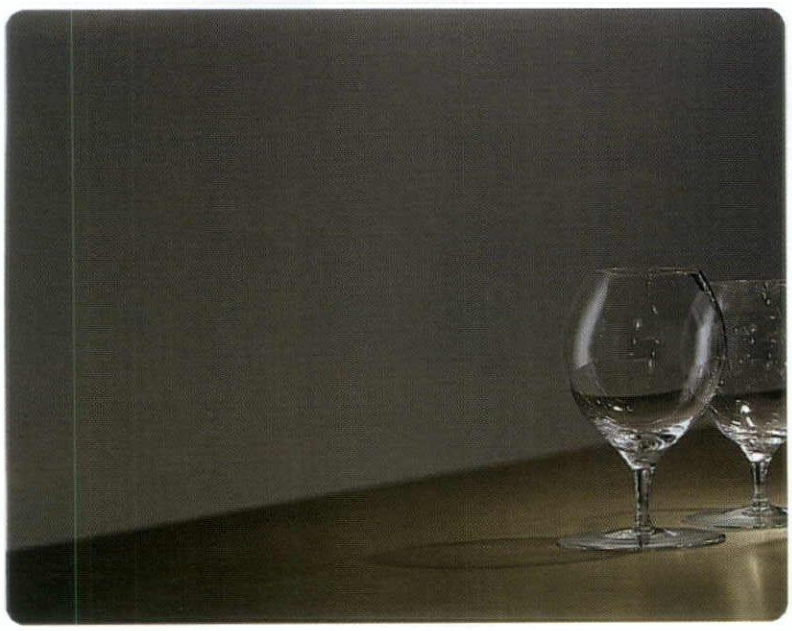
FAD LIGHTING (954) 677.9800 WWW.FADLIGHTING.COM

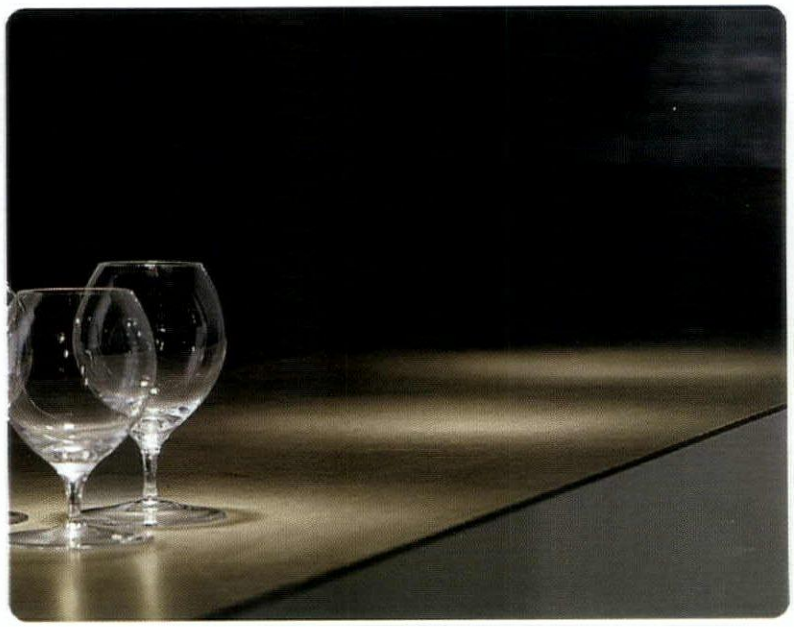
STUDIO ITALIA DESIGN

FAD
LIGHTING



INTRODUCING THE NEW COLLECTION
FOR THE STUDIO ITALIA 2003 CATALOG
AVAILABLE NOW IN PRINT OR CD





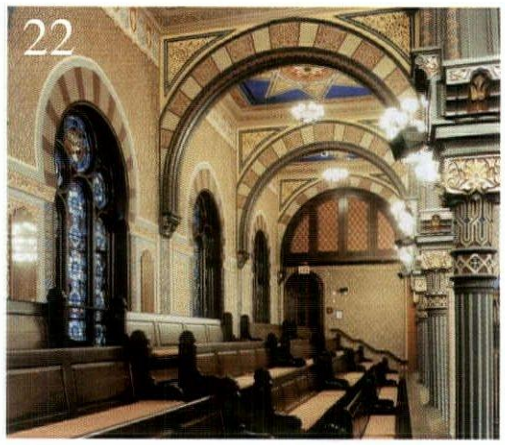
FAD LIGHTING **(954) 677.9800** **WWW.FADLIGHTING.COM**

Circle No. 95 on reader service card

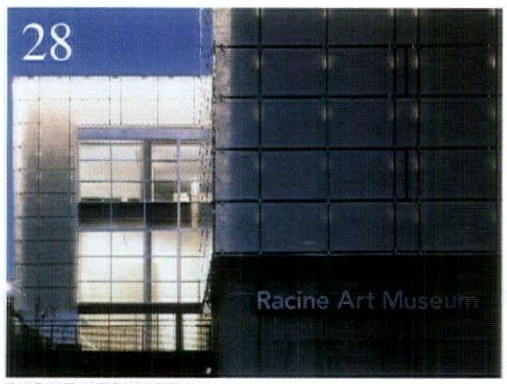
contents

architectural lighting

September/October 2003 vol.18, number 6



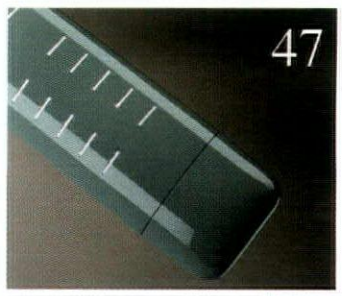
CENTRAL SYNAGOGUE

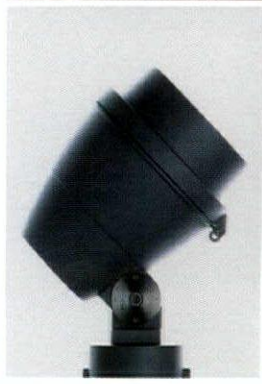


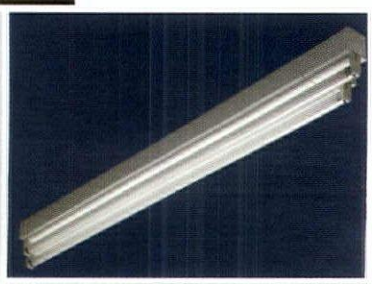
RACINE ART MUSEUM

DESIGN FEATURES

PRODUCTS USED IN ...







FEATURED PRODUCTS

IN FOCUS

DEPARTMENTS

Architectural Lighting (Vol. 18, No. 6 USPS 000-846, ISSN 0894-0436) is published seven times per year (Bimonthly except Monthly in March and June) by VNU Business Media, Inc., 770 Broadway, New York, NY 10003-9595 and is distributed free of charge to individuals or firms engaged in the specification of lighting products in the US and territories. The cost of all other subscriptions in the US and territories is $48 per year. A one-year Canadian subscription, payable in US dollars, costs $60 and all other foreign, $96. Canada Post Publications Mail Agreement No. 40031729. Periodicals Postage Paid at New York, NY and additional mailing offices. Printed in the USA. POSTMASTER: Send changes of address to Architectural Lighting, PO Box 1061, Skokie, IL 60076-8061.

[KAI]

c UL us LISTED

DESIGNER ROBERTO FIORATO

KAI

KAI WALL

KAI LUM

Prisma introduces **Kai**: innovative Italian design using durable materials such as die cast aluminum and glass. Aesthetically pleasing and functional, the **Kai** product collection offers outdoor and indoor applications as it's available in post, wall, and pendant versions. Offered in a wide range of lamp options such as Inc, Halo, CFL, MH, **Kai** is available in three standard finishes: chrome, metallic gray, white.

PRISMA NORTH AMERICA, INC.
300 PETTY ROAD, SUITE C
LAWRENCEVILLE, GA 30043
VOICE 770.822.2115 - FAX 770.822.9925
EMAIL: INFO@PRISMALIGHTING.COM
WWW.PRISMALIGHTING.COM

PRISMA®
ARCHITECTURAL LIGHTING

architectural lighting

SEPTEMBER/OCTOBER 2003 VOL.18, NUMBER 6

770 Broadway, New York, NY 10003

Real Estate and Design Group
Richard O'Connor, President
Adam Marder, VP, Operations

Real Estate and Design Group Publications: Architectural Lighting, Architecture, Commercial Property News, Contract, Hospitality Design, Kitchen & Bath Business, Multi-Housing News

Other VNU Business Publications Groups
General and Specialty Retailing; Retail and Food Media; Retail Design; Travel, Performance and Healthcare

vnu business publications usa

President & CEO: Michael Marchesano; **Chief Operating Officer:** Howard Lander; **Group Presidents:** Robert Dowling (Film & Performing Arts); Mark Holdreith (Retail); John Kilcullen (Music & Literary); Richard O'Connor (Travel, Performance, Food Service & Real Estate/Design); Michael Parker (Marketing/Media & Arts); **Vice Presidents:** Joanne Wheatley (Information Marketing); Barbara Devlin (Manufacturing & Distribution)

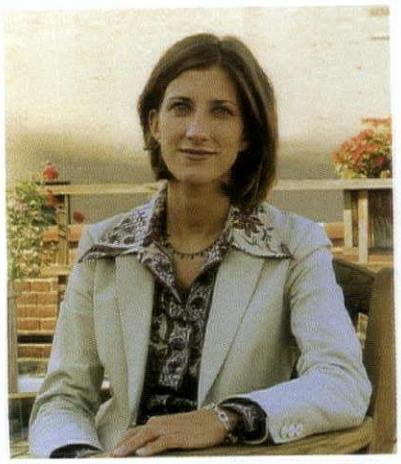
vnu business media

President & CEO: Michael Marchesano; **Chief Operating Officer:** Howard Lander; **Chief Financial Officer:** Joe Furey
President – VNU Expositions: Greg Farrar Executive **Vice President – eMedia and Information Marketing:** Toni Nevitt
Vice President/Business Management: Joellen Sommer **Vice President/ Communications:** Deborah Patton
Vice President/Human Resources: Sharon Sheer **Vice President/Licensing and Events:** Howard Appelbaum

BPA

editor'snote

IT'S FUN BEING THE NEW GIRL. YOU GET A LOT OF DATES.



Emilie W. Sommerhoff,
Editor-in-Chief

At lunch several weeks ago, industry icon and pioneer Sonny Sonnenfeld commented on the delicate hand of fate: one brief experience can lead to a lifetime of purpose. Mr. Sonnenfeld's career in theater and architectural lighting began with a play at summer camp, for which he managed the lights. The rest, as they say, is history.

I also have an identifiable moment to share. Eight years ago, new to New York and all but ignorant of the lighting design industry, I needed a job, preferably writing and editing as that was my background. A friend from college, who was working at *Contract*, suggested the publication's sister magazine *Architectural Lighting*, which needed an intern. The current chapter of this ongoing odyssey is in print before you.

I am very excited to be here. I admire this industry, but I particularly enjoy a mission. Years ago, after hearing I wrote about architectural lighting, an acquaintance responded in his British accent with all its implications, "Oh, [pause] subniche." A niche market, I'll give him; but an omnipresent one, important and spirited. For the lighting industry and professionals, changing this perception is our "lifetime of purpose."

There is a beautiful essay in Annie Dillard's Pulitzer Prize-winning *Pilgrim at Tinker Creek* called "Seeing," in which she explores the gift of awareness and perception—the ability to see the "unwrapped gifts and free surprises" offered up by the natural world. In this chapter, the references to light abound; she describes the many exquisite forms it takes, especially for the newly sighted who have not been conditioned to take it for granted. A girl who has regained her vision, standing before a tree in a garden, describes it as "the tree with the lights in it." Dillard is learning the art of seeing—everything, not just light: the flying insects in the foreground rather than the hemlocks across the road, snails and roundworms in a jar of creek water, the wind. When she finally sees the "tree with the lights in it," the experience is "less like seeing than like being for the first time seen, knocked breathless by a powerful glance. … I had my whole life been a bell, and never known it until at that moment I was lifted and struck."

The primary obstacle to more complete awareness of our visual experience, as Dillard points out, is that we see what we have been taught to expect. So many things go unseen, simply because we have no expectation at all; and this, I would argue, is too often the case with the quality of our built environment, particularly its lighting. My British acquaintance could not appreciate "the tree with the lights in it" or a masterfully lighted building over one that is simply just lit, because he had not been encouraged to expect masterful lighting or to know why it matters. He took its existence as a given and a constant, without room for improvement and not worthy of its own magazine. Architect Brad Lynch, whose firm designed the Racine Art Museum, which is featured in this issue, noted that good lighting often recedes into the design of a building, emphasizing the architecture not itself.

"The lover can see and the knowledgeable," says Dillard, but not often the layperson. As designers, architects and manufacturers—as the lovers and the knowledgeable—your charge in addition to creating quality lighting is to teach awareness of its presence and its absence. As editor of a magazine dedicated to the profession, it is my responsibility to help you. For our annual Applications Issue, managing editor Elizabeth Donoff and I have chosen projects that express in various ways what it means to be in the presence of light. They remind us to expect more from the buildings we design, witness and inhabit.

Featured on our cover, James Turrell's recent installation for Seattle's Henry Art Gallery speaks most clearly about this medium and its power. As contributing editor James Benya writes, "One stares at the blue field, experiencing the perceptual possibilities and the feeling of a place that is simply "light." The Racine Art Museum beckons its visitors with a glowing exterior; a German warehouse turns its façade into a theater of light; a synagogue in New York City, recovered from the ashes of a terrible fire, makes detailed work of 12 chandeliers; and an otherwise vanilla office space of a Texas headquarters is revived at the hand of light. If these projects aren't enough, a research study from the Light Right Consortium demonstrates a link between lighting quality and office worker productivity.

When I first arrived in New York eight years ago, the potential of light to give voice to a space was lost on me. I had a very capable teacher in Christina Trauthwein, who cultivated my first interest in architectural lighting, and taught me the fundamentals of trade publishing; hence, my editorial approach no doubt will seem familiar. But, as Dillard has expressed, there is value in reconsidering what is immediately in front of us, in picturing it a different way. For this reason, we are redesigning *Architectural Lighting*, enhancing its content and layout, and expanding our website. Look for it in 2004. And next summer, we will present the inaugural Architectural Lighting Design Awards.

There will be exciting changes to see. Please keep your eyes open. ■

eSconce Family

A RCHITECTURAL
A REA
L IGHTING

www.aal.net/eSconce

HUBBELL®
Hubbell Lighting

Circle No. 34 on reader service card

WILL WE BE LEFT IN THE DARK?

When 50 million people from New York to Ohio, and north to Toronto and Ottawa, Ontario, were abruptly plummeted into a power no-man's land on the afternoon of August 14, 2003, hundreds of thought raced through their minds. But the main questions—what is going on, when is the power going to be restored, and how did this happen—all highlight the fragile complexity of our nation's energy supply system.

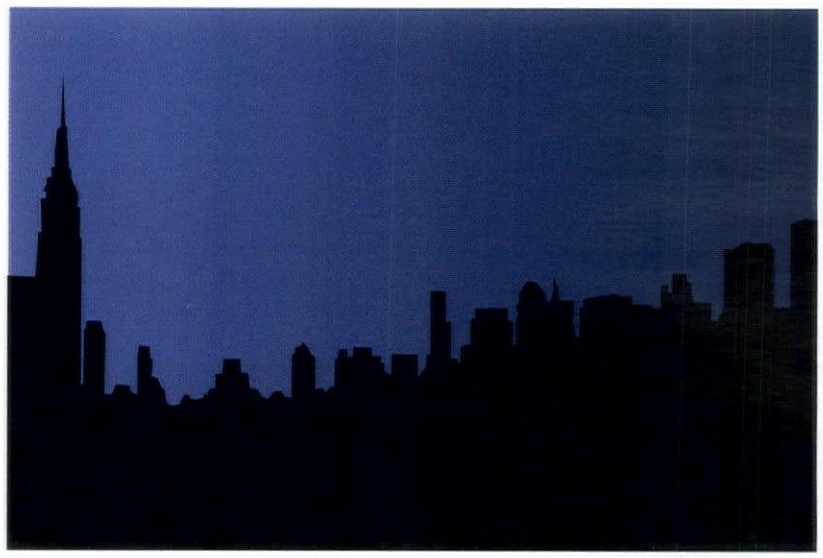
With the power restored, and the initial finger-pointing by our elected officials finished, several investigations are underway. A joint U.S.-Canada Power Outage Task Force has been formed, and it has delivered an initial timeline report of the events to both U.S. and Canadian legislatures. The North American Electricity Reliability Council, a voice from the private sector and the group responsible for monitoring the grid's reliability, has also begun an investigation.

With terms like "cascading blackout" and "power grid" now part of our everyday vocabulary, what is being done to prevent such a scenario from occurring again? How have new technologies, such as computers and cell phones, contributed to the overall increase in energy demand, and how much of the increased energy usage is directly associated with lighting? Although manufacturers and researchers continue to create more energy-efficient lighting devices, overall square footage demands have steadily increased by about 2 percent per year. So although lighting is more efficient, and watts-per-square-foot costs have decreased, more lighting is needed to cover the growing spacial demands. Lighting's relationship to energy consumption is an issue of quantity, not quality.

In this vein, research efforts are underway in a joint venture between the Lighting Research Center (LRC), the U.S. Department of Energy, the New York State Energy Research and Development Authority, the California Energy Commission, Connecticut Light and Power and several lighting manufacturers to create a simple and cost-effective load-shedding system for lighting to be used at critical moments when electrical demand is overburdened. In commercial applications, approximately 25 percent of energy consumption can be attributed to lighting.

Peter Moranti, director of energy programs at the LRC explains, "Lighting is ideal for load management for two main reasons: one, the load is predictable, and two, it is a repeatable process. When lights are turned off, you know the exact wattage reduction, and that can be repeatedly duplicated by an absolute number."

The LRC's research into load-shedding combines technology, hardware and human-factor elements. This system starts with a new type of ballast—currently in development—that will have dimming capabilities and an instant-start platform. Fluorescent tubes will be dimmable to a fixed level for short periods of time.



Dimming the bulb output by a third only affects the overall lamp life by 1 percent. The human-factor component of this research has shown that people can work effectively in a low-light environment for periods of time. In fact, lights can be dimmed up to 50 percent and the environment still be deemed "acceptable" by occupants.

In the event of a power surge, the building's energy-management system would instruct the lighting system to dim. A single signal can control up to 20,000 square feet of space, determined by the amount of wiring per square foot, not the number of fixtures. The dimming process could be controlled locally by the building or, in the event of a larger crisis, externally by a local utility. Preliminary studies have shown this is acceptable to building owners as long as they have the ability to manually override the external control should they need to. Next summer, the LRC will complete a real-time simulation in New York City at a conEdison facility.

In an age when we have come to take for granted our ability to instantly turn on lights and electronic equipment, what are our responsibilities in managing our own energy consumption? Determining the cause of the blackout, and why system safeguards were not effective enough to prevent this event, will take time. Hopefully the findings will enable the United States to accurately evaluate its energy system and in turn focus on the administrative reforms, infrastructure upgrades and commitments to new technologies necessary to create a power system worthy of a twenty-first-century nation. **Elizabeth A. Donoff**

LIGHTING FOR ALL FAITHS, AND OTHER COMPETITIONS

Light has long played a powerful role in religious architecture of all kinds, but how would you light one space that is intended to serve many faiths? The **Interfaith Sacred Space Design Competition** asks applicants to design a space in which "buddhists, christians, hindus, jews, muslims, pagans and followers of hundreds of other traditions would feel comfortable enough to practice their faith and share it with others open to observing or participating with them." The guidelines are more spiritual than structural: the design requirements include only three broad points. "The sponsors of the competition wish to be engaged intellectually by the admissions," states competition director Bill Liskamm. "They have no model in mind." The international competition is open to anyone. For more information, visit www.uri.org/designcomp. **Deadline: December 31**

Winners of the **Rome Prize 2004** receive a stipend and a fellowship at the American Academy in Rome. For information, visit www.aarome.org. **Deadline: November 1**

The 21st Annual IALD Awards call for entries asks that projects "be a permanent architectural lighting design solution for which construction was completed after June 1, 2001." Temporary installations are not eligible. The IALD is also initiating a sustainability award; projects submitted for the first award may also be submitted for the latter. This year, the IALD is requesting that entries be submitted in digital format. For more information visit, www.iald.org. **Deadline: December 1**

The 2004 IESNY Student Design Competition asks New York City design students to construct and apply light to a three-dimensional footprint. Cash and prizes worth $2,000 will be awarded. Visit www.iesny.org. **Deadline: December 5**

A lighting object is this year's theme for the biennial **Spertus Judaica Prize**—a design competition focusing on a specific Jewish theme or ceremonial element sponsored by the Spertus Museum in Chicago. The *ner tamid*, or Eternal Flame, hangs above or in front of the ark in synagogues and is never extinguished or turned off. Originally an oil lamp, the light is now fueled by electricity or gas. Applicants are asked to create a functional ner tamid. A $10,000 prize will be awarded to the winner of the contest. For more information, visit www.spertus.edu. **Deadline: December 5**

The theme of manufacturer Luraline's third annual **"It's *Your* Light"** student design competition is a fixture for outdoor applications. The company will recognize a winner with a prize of $1,500. For more information, visit www.luraline.com. **Deadline: December 31**

The Robert Bruce Thompson Student Light Fixture Competition 2004 challenge is to design a luminaire for computer workstation videoconferencing. First, second and third place carry cash prizes of $5,000, $2,000 and $1,000, respectively. For more information, visit www.rbtcompetition.org or see page 21.
Deadline: February 6, 2004

ON THE BLOCK

A rare incandescent light bulb—an Edison Type "A" 16-candle-power lamp—recently sold at San Francisco-based Bonhams & Butterfields (B&B) auction house for a staggering $11,750, well above the anticipated price of $5,000 to $7,000. In the early twentieth century, Edison Laboratories presented the bulb as a gift to Roy Congdon, who was responsible for installing and operating the first arc lights in Providence, Rhode Island. The unusual components of this bulb—which include a wooden shell base with a brass adapter, a pear-shaped bulb, a bamboo filament under high-pressure vacuum and nickel filament clamps—firmly link the bulb's origin to late 1880. B&B specialist Catherine Williamson, who helped identify the bulb with assistance from curators at the Henry Ford Museum, explains that the bulb's value is in part because it is such a recognizable item. A private East Coast collector interested in Americana purchased the light bulb. (Photo courtesy of B&B.)

LIGHT+BUILDING ANNOUNCES 2004 DATES

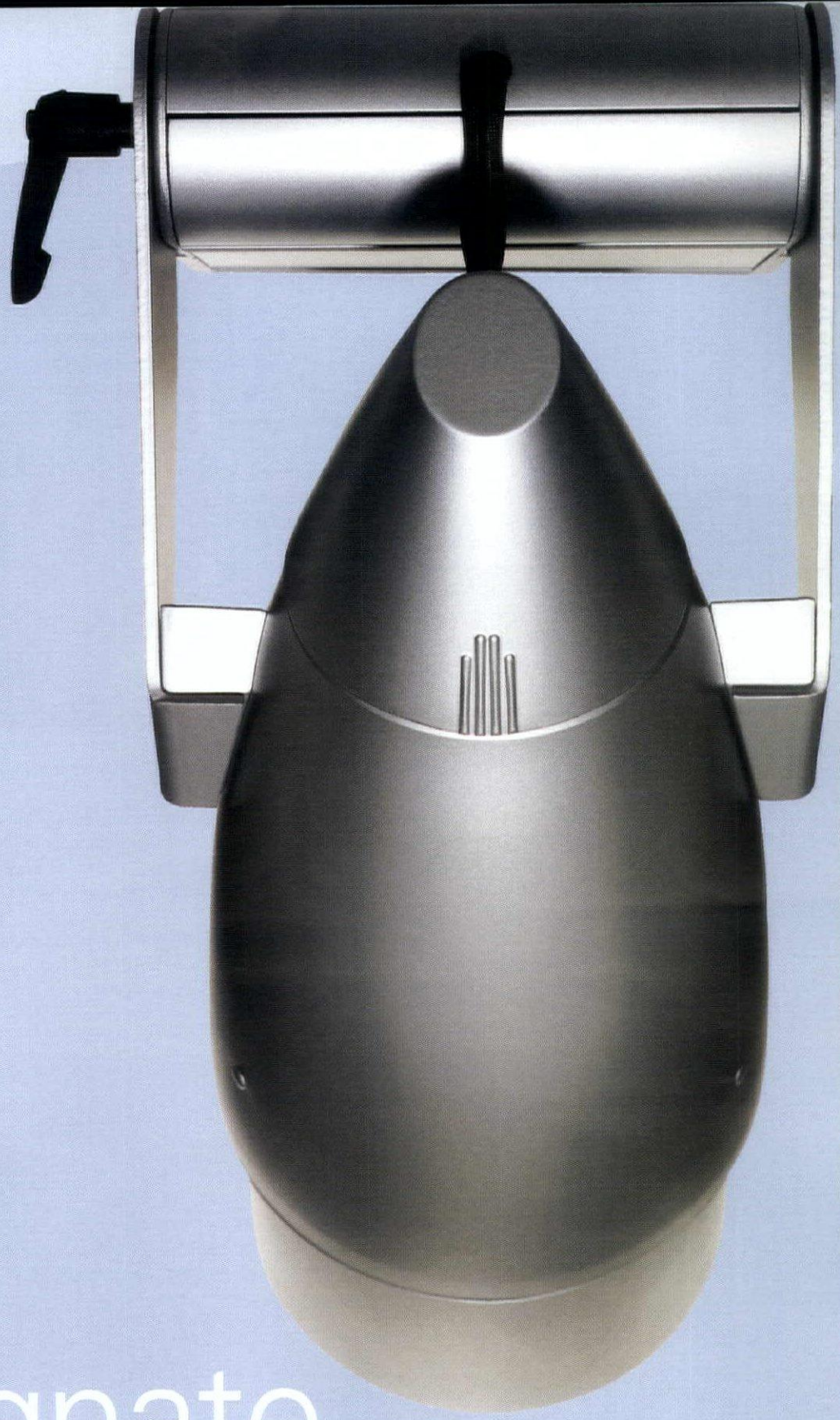
Light+Building, an international trade fair for architecture and technology, will be held in Frankfurt am Main, Germany, April 18-22, 2004. Next year's show will debut a new segment, "Architecturally Relevant Systems," which will cover solutions and ideas from the field of daylight technology, integrated façade technology, shading technology, glazing and conveyance equipment. The show will focus on aesthetic and design-oriented complete systems instead of on individual components. Light+Building 2004 will also offer special events, including Luminale, which will showcase the theme of light in Frankfurt. For more information, contact the Light+Building press team by phone (49) 69 75 75 6144, fax (49) 69 75 75 6758 or e-mail: jutta.stahlherber@messefrankfurt.com, or visit www.light-building.messefrankurt.com.

IIDA 2003 AWARD WINNERS

The 2003 International Illumination Design Awards were presented at the IESNA Annual Conference in Chicago in August.

This year, the Edwin F. Guth Award of Distinction for Interior Lighting Design was presented to the Smith Group and Sigma Associates for the Passenger Tunnel, McNamara Terminal/Northwest World Gateway. Receiving the Edwin F. Guth Awards of Excellence for Interior Lighting Design were Nihon Sekkei and Matsushita Electric Works for Meguro Persimmon Hall; Focus Lighting and Ruud Lighting for Mall at Millenia; Naomi Miller Lighting Design for Christ the King Church; Kugler, Tillotson Associates for Rewarding Lives; and George Sexton Associates for the Modern Art Museum of Fort Worth.

Obayashi Corporation was awarded the Paul Waterbury Award of Distinction for Outdoor Lighting Design for Oasis 21. The Paul Waterbury Awards of Excellence for Outdoor Lighting Design were presented to the Stone Mountain Lighting Group for Harrah's Atlantic City Resort & Casino; Brilliant Lighting Design and Arquitectonica for Façade/Show Illumination of the Golden Moon Casino; Ring & Du Chateau, Santiago Calatrava, and Kahler Slater Architects for Brise Soleil Lighting at Calatrava's Milwaukee Art Museum addition; and Illuminating Concepts for Paterna Leisure Entertainment. The Aileen Page Cutler Memorial Award for Residential Lighting Design was not awarded this year.



light magnate

MT6			
	LAMP TYPE	T6 METAL HALIDE	
	VOLTAGE	100, 120, 220, 240, 277	39-150 watts
	DIMENSION	10.4" (264mm) x 9" (229mm)	UL / CUL / CE listed

Seductive and powerful, the MT6 Series features an optically precise reflector, simple re-lamping from the rear, and an internal accessory cartridge. Ceramic Metal Halide technology makes this a brighter, and more efficient light to enhance any interior space.

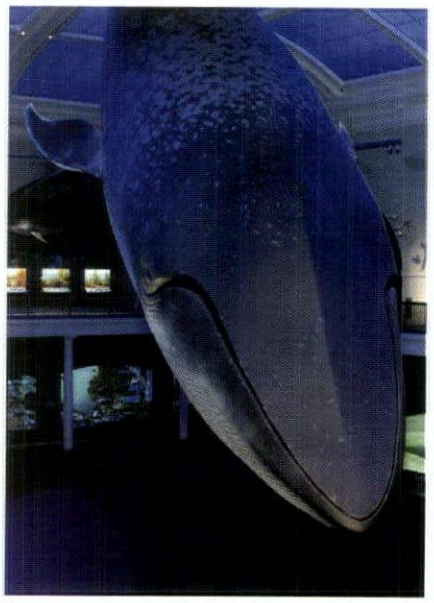
Lighting Services Inc The premier specialty lighting manufacturer.

architectural lighting ACE.al AWARDS WINNER

Lighting Services Inc 800 999-9574 www.LightingServicesInc.com

Circle No.39 on reader service card

LIGHTING NATURAL HISTORY



The recently renovated Halls of Ocean Life and Meteorites signals the American Museum of Natural History's commitment to upgrading its existing collections with twenty-first-century exhibit design.

After more than two years and a $25 million facelift, the New York City museum's Hall of Ocean Life reopened last spring, outfitted with state-of-the-art technology that includes video projections, interactive computer stations and hands-on models. Its recognizable dioramas have been renovated and relighted, and eight new ocean ecosystem displays added. The most prominent feature of the renovation is the 6,000-square-foot skylight. "The concept was to design a huge light box," explains in-house lighting designer David Clinard. Dimmable blue and white indirect fluorescents are projected onto a white ceiling above the skylight. Each glass square of the skylight, previously covered by acoustic panels, has been cleaned and retrofitted with a rear screen projection film that allows the gobo lighting effect of 40 metal halide projection lamps above the skylight to be seen. The grandeur of the hall provides a new context for its most prominent feature—the 94-foot-long model of a blue whale. Combined with the ceiling's lighting effect, eight shimmer lights attached to a custom track and projected onto the whale create the sensation of being underwater.

Nearby, the 2,700-square-foot Hall of Meteorites was completed in six months with a budget of $1.5 million. The room centers around Ahnighito, a meteorite fragment weighing 34-tons, whose structural supports penetrate the museum's floor to rest directly on Manhattan bedrock. The perimeter of the hall houses a series of triangular glass display cases. A miniature track of sixteen to twenty fiber-optic spotlights is vertically mounted along the cases' edges. Each light is focused to illuminate an individual meteorite sample.

The museum has its own Exhibitions Department with architects, lighting designers and multimedia experts, a unique attribute that Clinard notes has helped it explore new possibilities for display and lighting design. The Northwest Coast Indians Exhibit, the museum's first hall, is next in line for renovation.

LASER SHOW REINVENTED

As it renovates its exhibits (see "Lighting Natural History," this page), the same American Museum of Natural History is shedding its stodgy skin and running with the Gen-X crowd. *SonicVision*, which opened October 3 at the museum's Hayden Planetarium, marries the latest digital animation, colorful light and popular music to create a show that is sure to attract 20- and 30-something visitors that have not been to the museum since their sixth-grade field trip. In a collaboration between the museum and artist and musician Moby, who mixed the soundtrack, the dome has been transformed into a "fantastical dreamspace," taking audiences on a "mind-warping musical roller-coaster ride." *SonicVision* should also intrigue designers and artists with an imagination: the show pushes the boundaries of what can be done with projected light and computer graphics, causing the dome of the planetarium to be transformed into many different architectural views. In addition to tracks by Moby, the audio component features artists such as U2, David Bowie, Radiohead and David Byrne. A multidisciplinary team of animators, 3-D design experts, editors and media artists—and 1.3 terabytes of digital data—is responsible for the visual display. This event is ongoing, with multiple show times every Friday and Saturday evening. Tickets are available online at the museum's website (www.amnh.org).

Outdoor Lighting for Schools

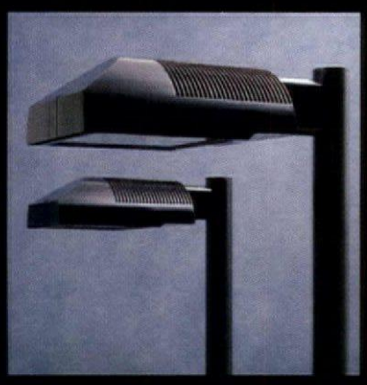
Progressive Design

Rugged Construction

High Performance

Low Maintenance

Dark Sky Compliant



KIM LIGHTING

16555 East Gale Avenue
City of Industry, CA 91745
626/968-5666

www.kimlighting.com

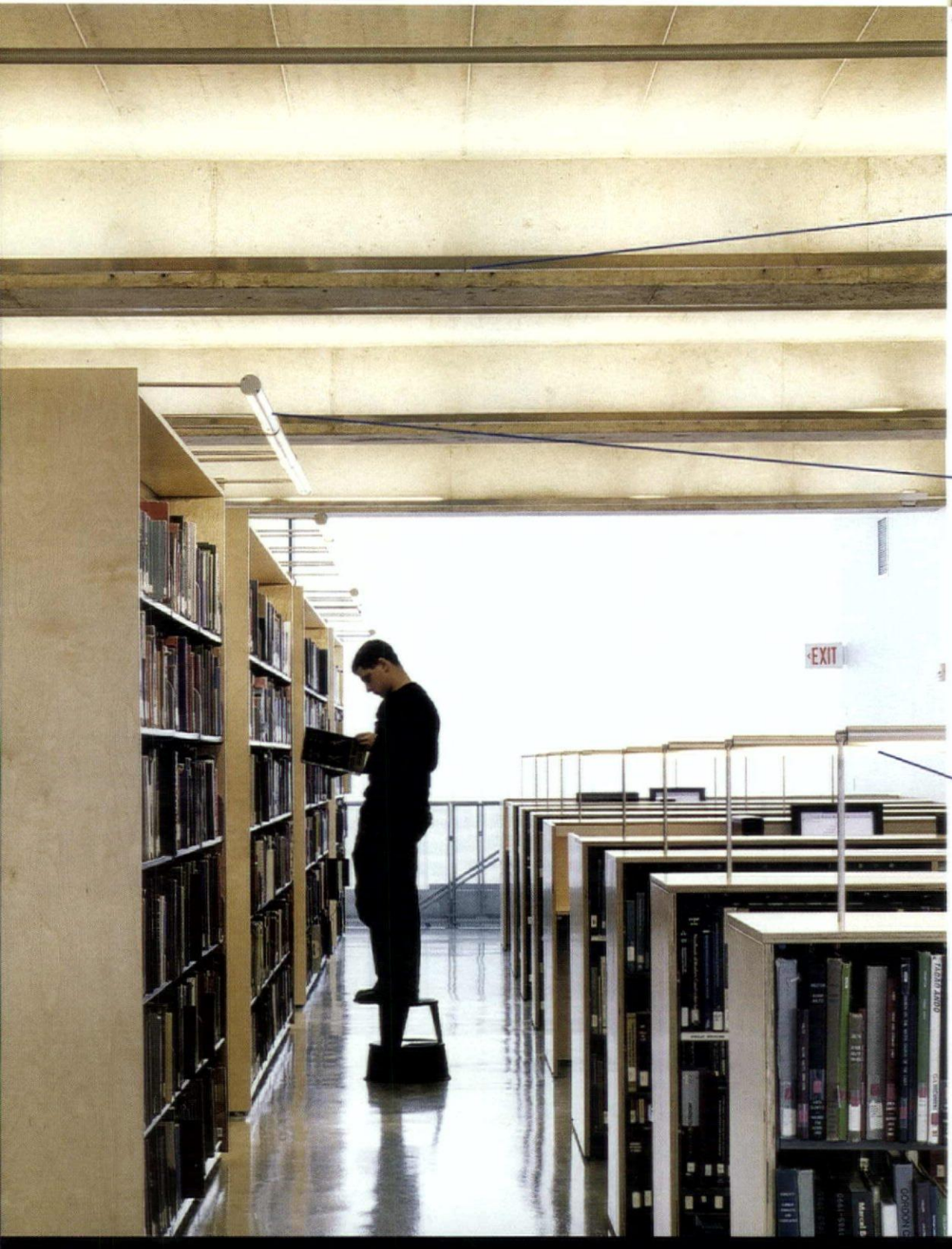
Circle No. 12 on reader service card

HUBBELL® Hubbell Lighting, Inc.

tailor-made.

ONE MORE ADVANTAGE OF USING BARTCO LIGHTING.

architect: Steven Holl Architects photography: ©Paul Warchol



Custom aluminum extrusion developed for uplight.

Modified display fixture used for bookstack illumination.

Display fixture **adapted** for task lighting.

bartco LIGHTING
leading the way and lighting it.™

YOUR **VISION.** YOUR **PROJECT.** YOUR **LIGHTING SOLUTION.**

manufacturers of quality lighting products

bartcoLIGHTING.com

tel 714.848.0892 fax 714.848.6843

CONFERENCES AND COURSES

BRIDGES IN LIGHT INAUGURAL SYMPOSIUM 2003

The Lighting Research Center is holding its first Bridges in Light Symposium on October 22, in Saratoga Springs, New York. The symposium will bring together leaders in lighting from both the public and private sectors. Morning sessions will focus on social and technological forces such as health, load management and LEDs. The afternoon program will address market segments including outdoor/roadway systems, residential, commercial real estate and healthcare. For more information and program registration call (518) 687-7100 or visit www.bridgesinlight.org.

GE ANNOUNCES CONFERENCE LINEUP

Celebrating its 75th year at Nela Park in Cleveland, GE Lighting's Lighting Institute has announced its fall 2003 conference schedule. The Outdoor Lighting Conference will take place October 30-31, and the Consulting Engineers and Lighting Designers Conference will be held November 10-12. CEU credits and learning units are available. For more information, call (800) 255-1200 or visit www.gelighting.com.

IALD MEETING AND EDUCATION CONFERENCE

The 34th annual IALD Annual Meeting and fourth annual education conference will be held January 30-31, 2004, in Vancouver, Canada. This year's conference will focus on the quality a professional lighting designer brings to a project, and the value of communication between manufacturer and specifier. For more information, call (312) 527-3677 or visit www.iald.org.

NUCKOLLS FUND REQUESTS PROPOSALS

A request for proposals for the Nuckolls Fund for Lighting Education 2004 grants has been posted on the fund's website—www.nuckollsfund.org. Educators at North American academic institutions who are seeking funding sources for programs that correspond with the fund's mission are invited to apply for grants. The fund supports college-level programs that inspire students with an understanding of light in architecture.

For 2004, the fund intends to award three grants: the $20,000 Nuckolls Fund Grant, given annually since 1989 to programs at the college level; the $10,000 Edison Price Fellowship Grant, given to individual educators to enable them to further their own education; and a $20,000 grant in support of an introductory lighting program.

SECURITY LIGHTING GUIDELINES HERE

The IESNA has recently made its *Guideline for Security Lighting for People, Property and Public Spaces* available, and will release its online course on the same topic in mid-October. The document covers basic security principles, illuminance requirements for different property types, protocol for evaluating lighting levels, and security survey and crime search methodology. The information is critical in today's age, when both security and liability are important issues. The online course is worth 1.5 AIA learning units. For more information, visit www.iesna.org.

GREEN IS THE COLOR OF MONEY!

Fiber optics saves energy, gains clients and builds a future.

Ruth Ellen Miller shares some amazing numbers on the cost effectiveness of truly "green" lighting. A leading innovator in conservation and preservation lighting, Ruth Ellen is President and co-founder of NoUVIR Research, Delaware Business Person of the year 2000, and has been featured on PBS television and in college textbooks as an expert on proprietary technology. Ruth Ellen also teaches, lectures and is a published author on lighting design and theory.

- Matthew Scott

MS: With continuing problems in California and the recent multi-state blackout, energy conservation is becoming more and more important in lighting.

REM: Energy conservation should be part of every job. But it's becoming a huge factor in choosing fiber optic lighting. When you can get 32 downlights from a single light bulb, you stack up impressive savings.

It used to be that the initial cost was the customer's only thought. Go out to bid and low bidder gets it. Today, customers are smarter. Now they will compare total costs, that's the initial cost factored for the expected product life plus the the operating cost over that life.

MS: Give me an example.

REM: O.K., the bulb in your table lamp at home burns out. You have a choice. You can buy a cheap 75-watt bulb for 50¢ or you can buy a 15-watt PL compact fluorescent for 6 bucks and get the same amount of light. Ignore the fact that the PL will have lousy color rendition and five times the UV. What do you buy?

MS: I've done that! The fluorescent had a big notice on the package saying it would save me $10 or $12 over it's life.

REM: So it was the better buy, as long as it lasted as long as promised. Did it?

MS: No. But some have.

REM: Would you feel better with a ten-year warranty?

MS: Of course!

REM: That's why NoUVIR offers a ten-year warranty, even on our fiber. Read peoples' warranties. Companies generally know how long their products will last. But we're getting off of the subject here.

MS: How much more efficient are fluorescent and HID's?

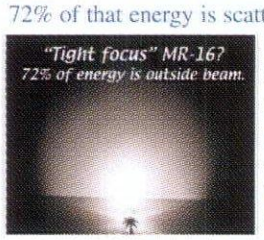
REM: Fluorescents and HID's are about the same. They are missing a lot of colors, but what color they have they hit really hard. About 20% of their energy output is visible light. The rest is UV and mostly IR - heat.

MS: Only 20%.

REM: Yes, but that is quite an improvement over the 5% visible light of an incandescent lamp.

MS: Your saying that a MR-16 is only 5% visible light? That's not very efficient.

REM: No, its not. Worse than that, an MR-16 wastes most of that 5%. Do some lab work and you'll find that 72% of that energy is scatter or spill outside the beam.



MS. Define scatter and spill.

REM: Spill is light from a filament or other source that misses the optical elements and goes everywhere. In an MR-16 it is the light from the bulb in the center that misses the reflector. That's about 120° of the lamp's output.

Scatter is the light that hits the optical element, but is misdirected. If the light was perfectly focused, you would see an image of the filament. Misfocusing the beam eliminates that image, but it causes scatter.

MS: So an incandescent lamp puts like 3 to 3.5% or its energy where you aim it?

REM: Three point six percent. Some people want to argue this. But invariably they are the people who have never taken a MR-16 or a PAR lamp in a dark room and really looked at the beam.

MS: So how does all this relate to conservation in terms of saving energy and money?

REM: We are all limited to certain sources for light. At NoUVIR we take out all of the non-visible radiation, all UV and all IR for preservation reasons. We want to eliminate photochemical and photomechanical damage.

But you get real energy savings by controlling the light. If you can put light just where you need it without any waste, you not only save, you get better lighting. All that scatter and spill is waste.

By the way, uncontrolled spill is also glare. Besides being annoying, glare causes people's irises to contract which increases the amount of light needed. So, you add lights, or power, which in turn increases glare. You end up with a space lit at two or three times what is should be and that puts a real dent in your energy saving plans.

MS: But can you control all of the light?

REM: Absolutely. We've got 50 fiber optic luminaires to pick from, all with no spill, no scatter and with all of the light in an adjustable beam.

MS: What do you mean adjustable?

REM: Each fixture zooms by simply moving the fiber. Our floods adjust from a 36° to a 72° beam, and every beam in between. Spots adjust from 15° to 50°. Pinspots adjust from 5° to 50°. You pick each luminaire according to the focus and the throw required and then focus each beam exactly where you want it and to the size you want.

Want 1.5 footcandles on a floor for ADA? You can have exactly that. Want 20 footcandles on an oil painting from across a room? You can do that too. Want to blow people away showing off a gem? Simple, just brightly frame it from a light in the top of the case. Change your mind and need a bigger beam, just readjust it. It's fun when you have such total control. You can get really creative!

A projector powers 32 fibers. And, each fiber can give you 300 footcandles over a three inch diameter circle to 1.5 footcandles over a 14 foot diameter or anything in between.

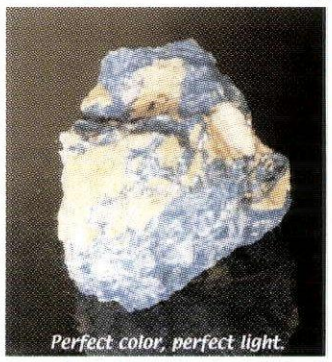
MS: How does this relate to energy?

REM: Let me give you a real world example. One of our museum customers took 700 framing projectors out of a gem and mineral gallery and replaced them with 40 fiber optic systems. So first off, they removed 660 light bulbs.

Because they could control light exactly, eliminating all of the wasted light; they increased the light on the actual exhibits by four times. Every watt they took out of the gallery took 3 or 4 watts off the HVAC system. The architecture looked spectacular, because cases were internally lit and the gems were the star of the show.

Bottom line was that the return-on-investment was just a little over one year. At 10¢ a kilowatt hour the energy savings alone is $87,000 a year. Add relamping and it goes over $100,000. That's a lot of green!

MS: How does an architect or lighting designer apply this new technology to selling a job or a project?


Perfect color, perfect light.

REM: You might start with a customer's utility bill or just count fixtures and watts. Our first gallery installation 12 years ago was funded by a utility. Their study documented a 70% energy savings. Since then we've increased our output by 50% with out increasing our power consumption. The example I gave about runs about 93%.

Then show a customer what you can do with this lighting. Perfect color, no wasted energy, no UV, no IR, awesome control, 32 lights a system, 70 to 90% energy savings, an incredibly fast return-on-investment and a lifetime return of ten times investment or more with our ten-year warranty, why would anyone want to use anything else?

MS: They own stock in a utility?

REM: (Laughs) Fiber optic lighting is not right for everything. But for fine applications, a beautifully designed room, a premier store or lighting things of value from rare artifacts to fine jewelry; NoUVIR gives a control and an energy efficiency unknown with anything else. Lighting designers owe it to themselves to get our catalog and really understand fiber optics. This is the future, right here!

people & firms

Ronnie Farrar from Duke Power in Charlotte, North Carolina, has assumed the presidency of IESNA effective July 1, succeeding Randy Reid. **Craig Bernecker** of the Lighting Education Institute is the newly elected senior vice president and president-elect for 2004-2005.

Ballinger, an architecture, engineering, planning and interior design firm, has relocated to 833 Chestnut Street, Philadelphia, 19107; phone (215) 446-0901.

Quality Lighting has appointed **Leonard Chocholek** manager of customer service and quotations.

Boyd Corbett has been made vice president of sales for Lightology in Chicago.

Holophane has named **Dawn De Grazio** manager, Light and Vision Center, Education and Training.

Paul Jaster has been added as product manager at Solatube International.

Jeffrey Roberts has been appointed executive vice president of Cooper Wiring Devices.

Susan Brady Lighting Design has relocated to 132 West 36th Street, New York City, 10018; phone (212) 391-4230.

Lutron Electronics has reorganized its Chicago-area sales force. **Paul Trively** will head up the Lutron Specification Team, while **McDonald Associates** has been appointed as Lutron's new local manufacturer's representatives.

Varon Lighting, parent company of Beacon Products, DJS Industries, Rockscapes and Thomas Research Products, has moved to Elmhurst, Illinois; phone (630) 995-2550.

websites

Advance Transformer has enhanced its website at www.advancetransformer.com.

LAM Lighting Systems, a division of JJI Lighting, has a new website at www.lamlighting.com.

The **Mintz Lighting Group** has a new website: www.mintzlighting.com.

Searchspec.com has two new product categories, pendants and wall sconces, now available at its website. The pendant section contains 1,138 pendants from 25 manufacturers; the sconce section contains 1,723 sconces from 36 manufacturers.

anniversaries

Huntington Park, California-based **Nova Lighting** is celebrating its 80th anniversary. The company was formed in 1923 in Brooklyn, New York, by Murray Langbaum, David Moskowitz, and Israel Langbaum.

Lighting Services Inc is celebrating its 45th anniversary.

SCHEDULED EVENTS

2003

November 4-8 BIEL Light+Building Buenos Aires. Contact: (49) 69 7575-6477, iris.jeglitzamoshage@messe-frankfurt.com or www.light-building.messefrankfurt.com.

November 12-14 The USGBC Greenbuild International Conference and Expo, David L. Lawrence Convention Center, Pittsburgh. Contact: (330) 425-9330 or www.greenbuildexpo.com.

November 18-21 The 8th Guangzhou International Illumination Exhibition, Chinese Export Commodities Fairground, Guangzhou, China. Contact: www.illuminationchina.com.

November 19-21 ISH Light+Building Asia, Singapore Expo, Singapore. Contact: info@singapore.messe frankfurt.com or www.light-building.messefrankfurt.com.

November 21-23 LDI 2003 The Entertainment Technology Show, Orange County Convention Center, Orlando, Florida. Contact: (800) 527-5007, (203) 358-3751, registration@primediabusiness.com or www.ldishow.com.

2004

January 30-31 IALD Meeting and Education Conference, Morris J. Wosk Centre for Dialogue at Simon Fraser University, Vancouver, Canada. Contact (312) 527-3677 or www.iald.org.

March 11-12 Architectural Lighting Master Classes, John Jay College, New York City. Contact: Christina Mendez (800) 950-1314, x4581; fax (646) 654-4597; cmendez@vnubuspubs.com, www.lightforum.com/masterclasses

April 21-24 Restoration & Renovation Boston 2004, Hynes Convention Center. Contact (978) 664-6455, fax (978) 664-5822, info@restoremedia.com, www.restorationandrenovation.com.

www.techlighting.com

Tech trak™ - winner of the Lightfair 2003 Design Excellence Award for most innovative new product

TECH trak™

Tech Lighting's Tech trak™, the first-ever hand-bendable line-voltage track lighting system.

The revolutionary design features a sleek metal track that can be curved in the field to form practically any shape, while simultaneously providing powerful and versatile illumination options.

Tech trak™ — it's track lighting with a twist.

breeze

Ceramic Metal Halide	CMH T4.5	CMH PAR30 Long
Incandescent	PAR30 Short	PAR30 Long

gamma

Ceramic Metal Halide	CMH T4.5
Incandescent	T3

omega

Ceramic Metal Halide	CMH T4.5	CMH PAR20	CMH PAR30 Long
Incandescent	PAR20	PAR30 Short	PAR30 Long

sportster

Ceramic Metal Halide	CMH PAR20		CMH PAR30 Long	
Incandescent	PAR16 GU10	PAR20	PAR30 Short	PAR30 Long	PAR38

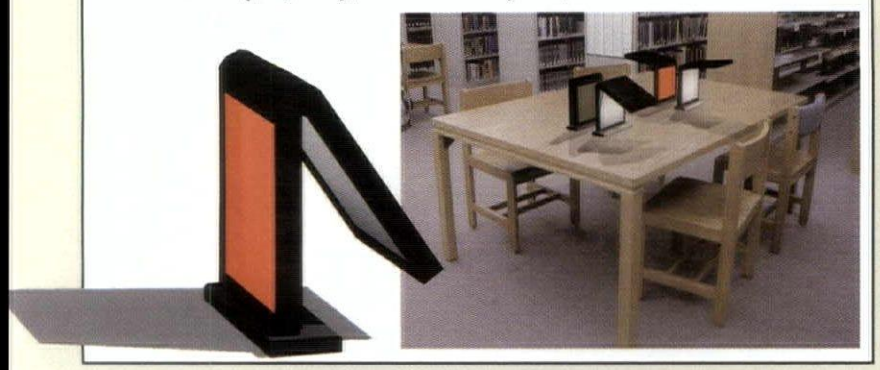
spot

Ceramic Metal Halide	CMH PAR20	
Incandescent	PAR20	PAR30 Short

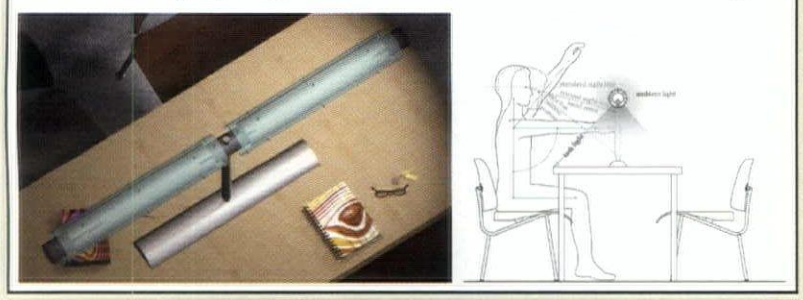
TECH Lighting®

Circle No. 8 on reader service card

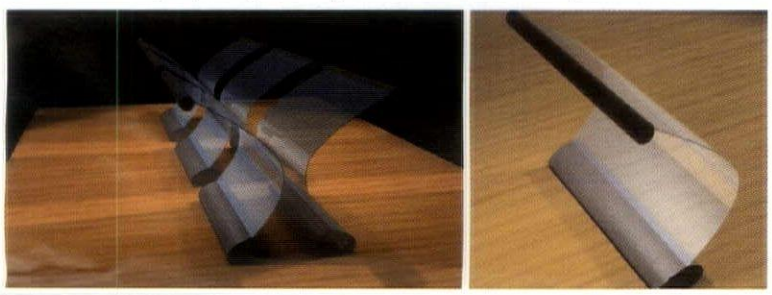
1st Place ($5,000), Michael Snyder, Univ. of Kansas



2nd Place ($2,000), Susana Lau, Univ. of Texas at Arlington



3rd Place ($1,000), Enrique Vela, Univ. of Syracuse



RBT

THE ROBERT BRUCE THOMPSON

Annual Student Light Fixture Design Competition

Attention professors and students:
The 2004 Competition Design Problem has been announced. (Design a luminaire for computer workstation videoconferencing.)
Go to www.rbtcompetition.org for details.

Deadline for submissions is February 6, 2004.

The 2003 Winners, at left, designed a table-mounted light fixture for a library reading table.

Phoenix from the Flame

New York's Central Synagogue rises from the ashes of a devastating fire.

BY JEAN NAYAR, CONTRIBUTING EDITOR

After a 1998 fire devastated New York City's Central Synagogue, Hardy Holzman Pfeiffer Associates led a restoration effort that included the skills of more than 70 specialty firms and almost 700 workers. New chandeliers—inspired by those in a nineteenth-century Budapest synagogue—match the diameter of the stained-glass rose windows in the bays above (facing page).

Shortly after Hardy Holzman Pfeiffer Associates (HHPA) completed its three-year restoration of New York City's Central Synagogue in 2001, architect Hugh Hardy reflected on the structure's infectiously upbeat spirit. "Of all late-nineteenth-century New York buildings," he said, "none convey greater optimism in the future of America." If, as Hardy suggests, this ornate, Moorish-inspired structure stood as a testament to hope when Prussian-born Henry Fernbach, considered America's first practicing Jewish architect, designed it in 1872, then its remarkable restoration by HHPA promises that its exuberant spirit will continue to flourish.

In 1998, however, after a fire devastated this National Historic Landmark, its fate was not so certain. During a renovation that year, a welder's torch set the synagogue ablaze, destroying the roof and almost all of the carved woodwork and decorative surfaces inside. "The level of destruction was shocking," recalls Jonathan Schloss, an associate at HHPA and project manager of the restoration. But rather than start from scratch, the congregation, which now numbers 4,500 people—thirty times more than when the synagogue was first designed—decided to rebuild within the historic walls. "Our charge was to restore the building, and at the same time create a synagogue that looks to the future," says Schloss. "From this standpoint, although the fire was a tragedy, it offered an opportunity to bring back the spirit of the original building and also to make it as technologically advanced and flexible as possible."

ORIGINAL INFLUENCE

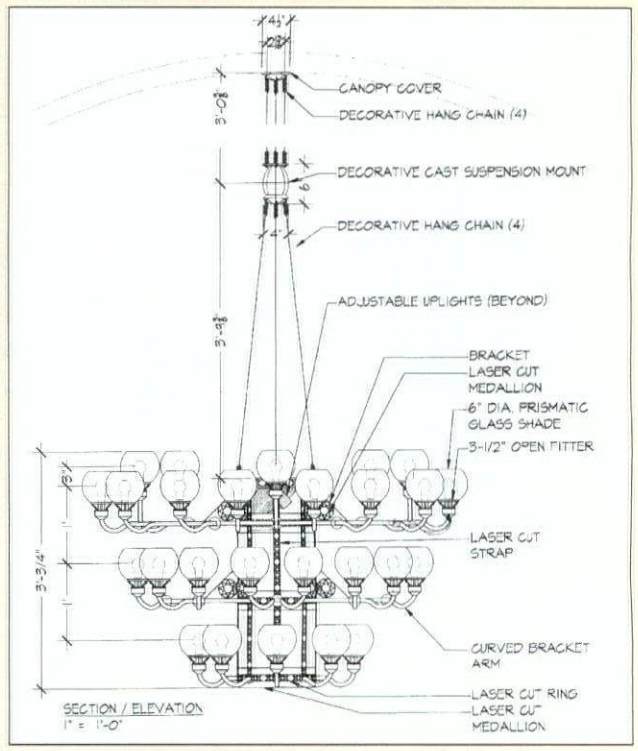
One of the most significant aspects of the synagogue's updated technological sophistication is its lighting. Designed by Fisher Marantz Stone, the lighting system comprises 36 zones in the sanctuary alone and offers an exceptional amount of variation and control. It also brings illumination levels up to contemporary standards, which influenced the architects' interpretation of the historic interior finishes. "In our analysis of historic documents, we estimated the walls of the original interior to have been stenciled with between 110 and 120 colors," says Schloss. "At the time the synagogue was built, it was illuminated with gas fixtures located mostly at the base of the building." So a muted burnt-orange color in a pattern near the ground level, for example, became a fluorescent shade of orange near the ceiling to achieve consistent character as the level of illumination dimmed near the top. "Because the new light levels are much higher, we reduced the number of colors to about 69 or 70 to keep the hues at the top from looking garish," he says. "In this way, we established

GOD IS IN THE DETAILS

While they only deliver 3 to 5 footcandles of the overall lighting scheme per fixture, the twelve chandeliers that edge the main aisle of New York City's Central Synagogue became a prominent element of the building's restoration following a 1998 fire. The sheer size of the decorative luminaires—which measure more than 5 feet in diameter and feature 48 globes each—is enough to impress even a nonbeliever. But it is the story behind their design that is most captivating.

The original light fixtures had been removed in an early renovation, so no first-hand example of the chandeliers was recovered from the debris. Nor was there any living memory of their form, though several black-and-white images still existed. "In the photographs, the lights appeared like big, glowing white balls," says project manager Hank Forrest of Fisher Marantz Stone, the lighting design firm for the project. "So we had a good idea of where the lights were located, but no idea what the fixtures themselves looked like." The congregation wanted to revive the building's 1872 design, but without documentation, they could not recreate the original gas-lighted chandeliers.

The design team turned to the 1859 Dahany Utca Synagogue in Budapest, which is believed to have been an inspiration for the New York building's architect. The Hungarian synagogue had also installed new decorative fixtures, and its contemporary approach to this nineteenth-century detail intrigued the team. Ultimately, Central Synagogue's chandeliers captured much of the same character, but for one element: "Typically, the area above a gas jet or globe would be open to let smoke escape," explains Forrest; the lamps in the Budapest fixtures were set sideways and upside down, giving them away as electric. The upright, open-globe design approved by Central Synagogue's congregation replicates the appearance of gas lighting, truer to the earliest version. (The open top also means that removing the globe is not required to relamp—which considerably reduces maintenance time, since there are 576 lamps in the main chandeliers alone.)



Various arm drawings (left) suggest the intensity of the design process that produced the synagogue's new chandeliers (above).

However, unlike the original fixtures, which were probably ordered from a catalog, the new luminaires are completely custom and the conclusion of much back and forth with manufacturer Winona Lighting. In an even greater divergence, the team designed the chandeliers almost entirely on CAD. "We were trying to control fees as much as possible," says Forrest. "We wanted a family of custom fixtures, so once we had the central elements designed, we could just repeat those for the different fixtures. It is that repetition that the computer does so well." The family included four different versions of the decorative pendant, two wall sconces and a ceiling-mounted fixture in the basement meeting room. To insure matching finishes and details, Winona fabricated all fixtures that descended from the design of the large chandelier.

The greatest departure from both the original design and the one that was destroyed in the fire is the lighting levels, and that makes all the difference. "Generations of congregants had complained about the lack of proper lighting," says Forrest. "Even though the painting and a lot of other work had been there before, there was so little light it was hard to notice." **Emilie W. Sommerhoff**

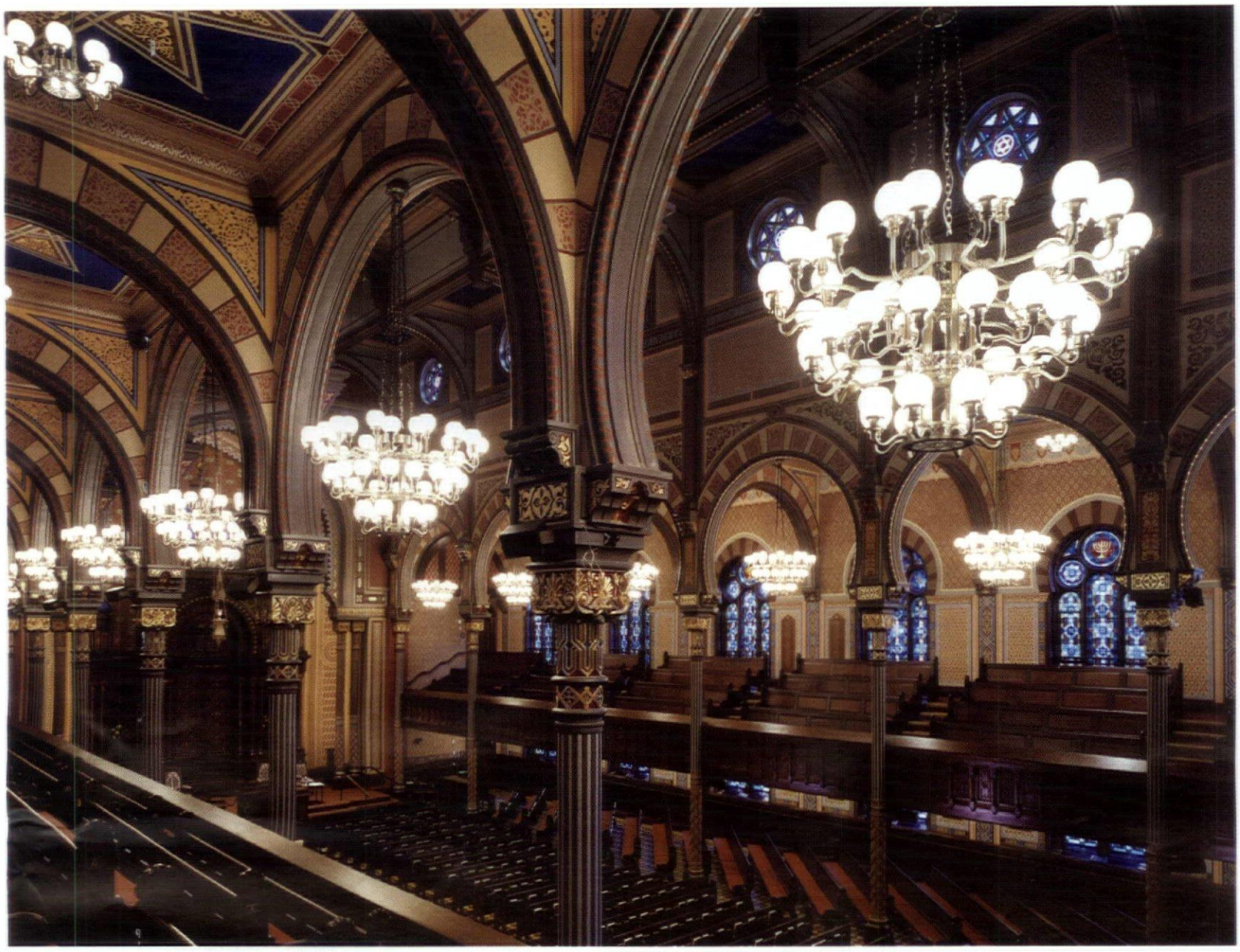
a connection with the building's history, but didn't necessarily replicate it."

This philosophy—one of remaining true to the spirit of the original building without being servile to its details—also drove the development of the family of fixtures created by the lighting designers for the synagogue's massive main sanctuary. Although the architects had unearthed several black-and-white photographs among many other research materials to help guide the $38 million restoration, no clear record of the chandeliers remained. (See "God Is in the Details," this page.) According to lighting designer and principal-in-charge of the project Paul Marantz, "We knew the original architect was inspired by a synagogue in Budapest. Collaborating with the architects, Matthew Toomajian from our office designed fixtures that were historic in scale and visual language, but modern technologically."

Influenced by the chandeliers in the Budapest synagogue, the Central Synagogue's twelve main decorative fixtures—suspended from the arches separating the side aisles from the central space—feature 48 glass globes supported by curved bronze arms. The prismatic globes were made in the Czech Republic and, consequently, required an extra effort, including packages of broken product and a state agency as the go-between. "We were looking for the sparkle that you could get out of a patterned, prismatic globe, rather than something that diffused," explains lighting designer and project manager Hank Forrest of Fisher Marantz Stone.

Designed to match the scale of the circular stained-glass windows in each bay near the ceiling, the chandeliers stretch more than 5 feet in diameter and house a 60W halogen A lamp per globe. Tucked into the core of each and aimed at the ceiling, two 250W halogen PAR lamps highlight the painted detailing. A series of smaller, 30-inch-diameter chandeliers, with eight globes containing a 60W halogen A lamp each, include four 60W halogen PAR lamps for downlighting to illuminate the balcony levels of each bay in the side aisles. Two other variations of the decorative pendant are used in the front lobby and stairwells. Decorative sconces, which complement the chandeliers and sport three globes containing incandescent A lamps, illuminate the lower levels of the side aisles, continuing the family of fixtures. A series of 22-inch-diameter surface-mounted domes on the undersides of the balconies containing four halogen A lamps a piece add to the ambient illumination.

The restoration allowed the architects to incorporate a large social hall by excavating below ground (left). Hand-blown decorative globes fitted with 60W halogen A lamps and custom fixtures that descend from the chandelier design illuminate the hall. Sconces on the wall also use 60W A lamps, while recessed 150W A lamp downlights provide general light for the space. Beyond the translucent glass doors is an atrium alley for additional gathering space.



Increased light levels enhance the polychrome stencilwork on the walls and ceiling and the plasterwork of columns and capitals, and the intricate tracery of the roof trusses. The light from the 48 globes is essentially decorative; the functional illumination comes from two PAR lamps concealed within the chandelier's core. Smaller chandeliers over the balconies (above, upper left) and sconces on the lower levels of the side aisles continue the family of historic-inspired fixtures.

SPIRITUAL CLARITY

Most of the functional illumination in the sanctuary comes from a series of 500W PAR56 pipe-mounted fixtures hidden above the grillwork in the central ceiling. "A real problem in churches and synagogues is that one is expected to know by heart all there is to read and do," says Marantz. "But for an aging population with older eyes, it's very hard to see when there's hardly any light." According to Marantz, the light level in the original structure was probably about 1 to 2 footcandles, but the new lighting scheme brings the level in the sanctuary to between 15 and 30 footcandles.

To enhance the sacred aura of the bema, or pulpit area, where the ark housing the Torah is located, the architects uncovered a stained-glass skylight above that had been tarred over during a previous renovation, allowing daylight to stream through. Approximately 82 linear feet of incandescent striplight utilizing 60W T10 lamps was concealed along the perimeter of the arch around the bema, giving it a halolike glow. The synagogue's original Eternal Light, which hangs over the bema, was recovered, refinished and fitted with new lamps to create the effect of shimmering candles in the lantern at its base, and in its menorahlike crown. Two MR16s hidden in the Eternal Light also accent the Ten Commandments inscribed in the ark, and concealed PAR38s highlight floral arrangements in the niches flanking the ark.

The control system near the bema and the secondary portable theatrical light system in the organ loft elevate the synagogue's lighting scheme to state of the art. "The controls are remote accessible and preset for seven lighting schemes," says Schloss. "The theatrical lights can be adjusted for special occasions, including televised events."

In the early days of the restoration process, says Marantz, there was enormous anxiety on the part of the congregation's restoration committee over the lighting plans. "But we knew we passed a great test," Forrest says, "when the synagogue reopened and the rabbi mentioned to me that some members thought the chandeliers looked much better than they ever had before." ■

TURN TO PAGE 47 FOR INFORMATION ON FIXTURES AND SOURCES IN THIS PROJECT.

DETAILS

PROJECT Central Synagogue **LOCATION** New York City **ARCHITECT** Hardy Holzman Pfeiffer Associates, New York City **LIGHTING DESIGNER** Fisher Marantz Stone, New York City—Paul Marantz, Hank Forrest, Matt Toomajian, Randy Fisher, Grant Loomis **PHOTOGRAPHY** Peter Aaron/Esto **LIGHTING MANUFACTURERS** BK Lighting, Edison Price Lighting, Elliptipar, ETC, Lighting Services Inc, Winona Lighting

Knowing Light

It's more than an exhibition; it's the intersection of art and architectural lighting.

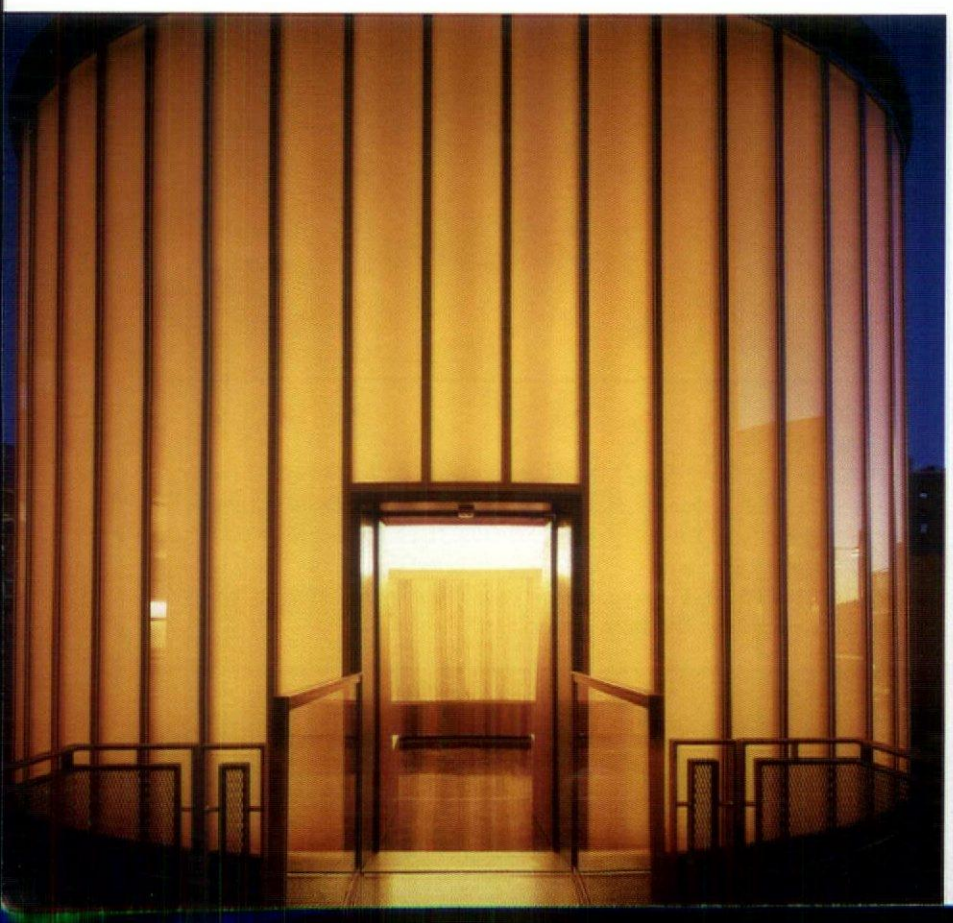
BY JAMES BENYA, CONTRIBUTING EDITOR

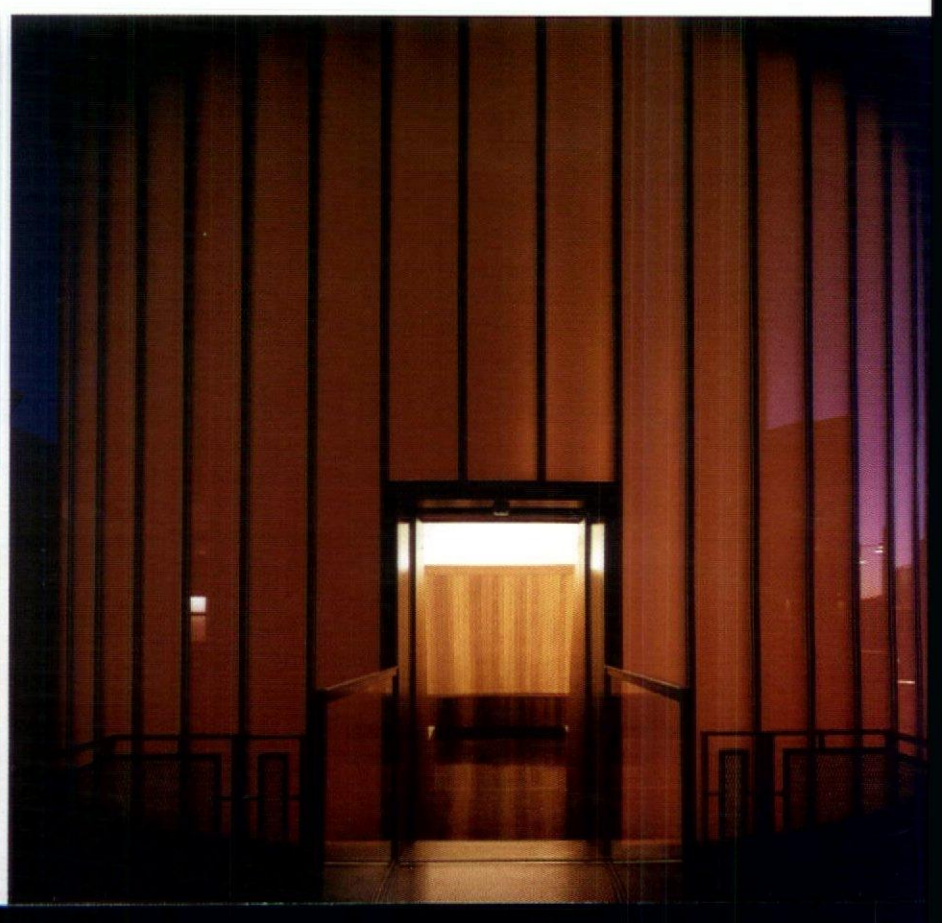
Noted artist James Turrell is featured in an exhibition, *Knowing Light*, at the Henry Art Gallery on the campus of the University of Washington in Seattle. The exhibition includes *Light Reign*, a permanent work in the Skyspace series, which resides in the museum's sculpture court. This and several other pieces in the exhibit are the latest in Turrell's exploration of light, ambience and perception.

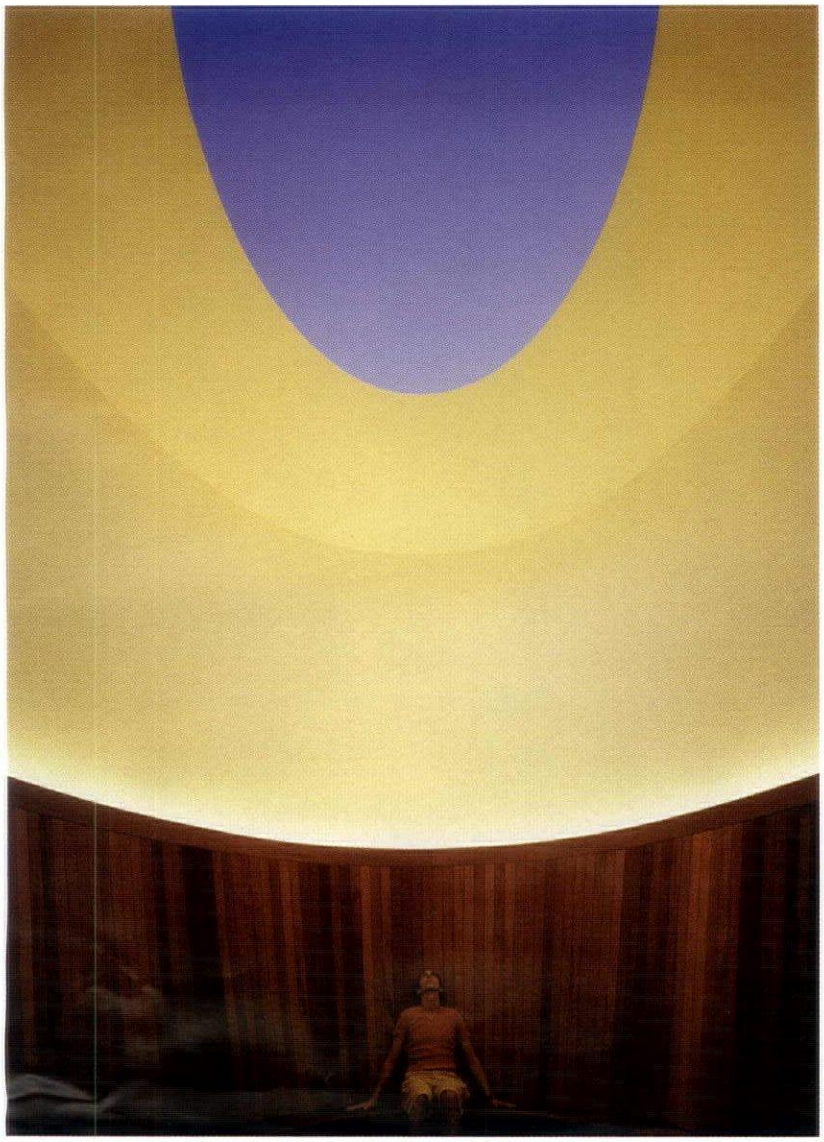
There is a striking, if not profound, kinship between the work of James Turrell and the use of lighting in architecture. In its purest sense, architectural lighting is the careful manipulation of light and color to support the visual needs and complement the perceptual intent of functional buildings. Turrell taps the ability of light to affect perception and creates environmental situations in which light is free of the boundaries of function, able to be what the viewer perceives. For those experienced in architectural lighting, viewing Turrell is to enjoy an inspiration in our commonly held medium of light.

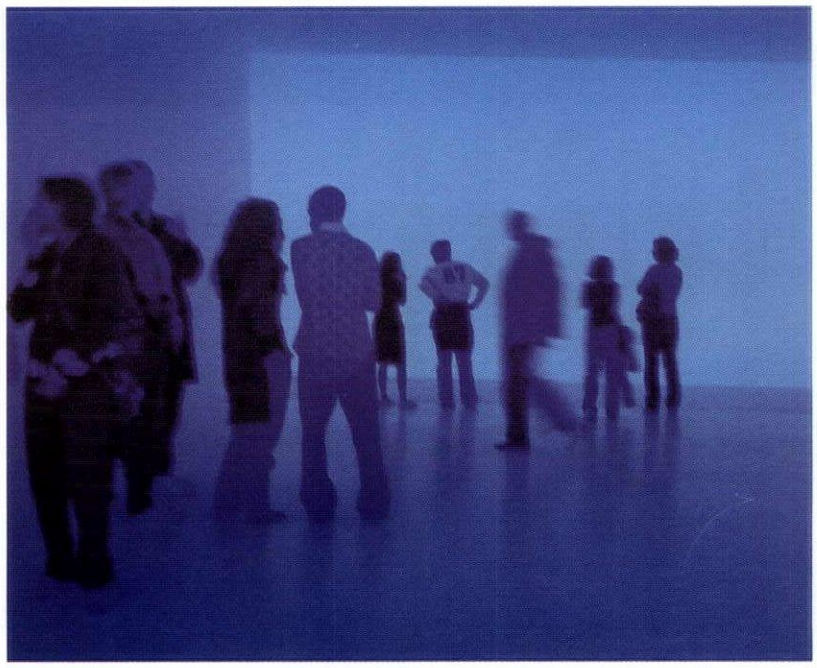
Turrell is considered a member of the light and space art movement. The artist's works have been shown in over 100 solo and numerous group exhibitions in top museums throughout the world since the late 1960s. He has been the recipient of a MacArthur Foundation Fellowship, an Arizona Visual Arts Fellowship, a National Endowment for the Arts Grant and a Guggenheim Fellowship. He is the winner of the Wolf Prize (Israel, 1998), the Arizona Governor's Award (1997), the Friedrich Prize (Germany, 1992) and the Chevalier (France, 1991). He was also recognized with a Lumen Award from the IESNA New York in 1981.

In 2004, Turrell will complete the first phase of a life's work, an amazing construction at Roden Crater in northern Arizona. A "vast composition of corridors to funnel celestial lighting into spaces beneath the volcano's cone," the Roden Crater project represents an investment of over $21 million dollars and 30 years. The result, when the entire project is completed later this decade, will be a modern Stonehenge,









> Light is a powerful substance. We have a primal connection to it. But, for something so powerful, situations for its presence are fragile. I like to work with it so that you feel it physically, so you feel the presence of light inhabiting a space. I want to employ sunlight, moonlight, and starlight to empower a work of art.
>
> — *James Turrell, from* Occluded Front: James Turrell *(Los Angeles: Fellows of Contemporary Art and Lapis Press, 1985)*

The exhibit *Knowing Light* features several James Turrell installations including Skyspace, *Light Reign* (facing page and above), in the Henry Art Gallery Sculpture Court in Seattle. The work was commissioned to commemorate the Henry's 75th anniversary. *Spread* (above right), Turrell's ganzfeld piece in the exhibit, utilizes an optical phenomenon in which the eye has no point to focus on.

a place where the light of cosmic alignment is celebrated in a composition of almost overwhelming scale. Indeed, Roden Crater will be one of the most important art works of the decade, if not the new century.

But back here on earth, the current exhibition includes three temporary environmental works, plus a small collection of drawings, and the plans and models for Roden Crater. Each of the environmental works is a successor to Turrell's dramatic artistic history, representing the latest, best and boldest of his experiences in light and perception. *Kemo Sabe*, from the Magnetron series, employs the diffused image of a television screen; *Shaeffner*, a "spectral wedgework" from his Milk Run series, consists of a wedge wall in a rectangular space, illuminated by slits of light as though through a cracked door; and *Spread*, the largest piece, is a blue illuminated *ganzfeld* (broad field) wall on one end of a white box room, from his Wide Out series. But the biggest attraction and most ambitious work is *Light Reign*, built in celebration of the Henry's 75th anniversary.

SKYSPACE, 2003

Once inside *Light Reign*, one is encouraged to sit and look up—much as a lighting designer would do upon walking into an interesting room. A luminous ellipse dominates the ceiling's center, with the adjacent ceiling and upper walls illuminated by a continuous neon cove. This piece is elliptical in plan, but Turrell has also created square and rectangular Skyspace installations, including *Unseen Blue* (2002) at Pittsburgh's Mattress Factory.

By day, the roof opens and the viewer sees sky and clouds; by night, the aperture is closed and illuminated by blue neon. The color contrast between the warm neon cove (about 2800K) and the blue is dramatic: The walls take on the color of a gradient dissolved between the two. One stares at the blue field, experiencing the perceptual possibilities and the feeling of a place that is simply "light."

Unlike other Skyspace pieces, which are either interior volumes or solid walled structures, the Seattle work is a building, an elliptical cylinder sitting atop two concrete columns. An aluminum frame supporting vertical facets of backlighted acrylic forms its exterior skin.

The acrylic backlighting is the star of the show. Using a state-of-the-art LED color-changing system, the entire cylinder slowly transforms its exterior color as the viewer watches. The detailing is superb, without a hint of hot spot or striation. This glowing, color-changing sculpture/architecture actually seems at home in the garden, floating in front of the older portion of the gallery, and complementary to the more recent Gwathmey Siegel-designed addition and adjacent entry structure.

However, pondering the color-changing walls, one might ask, haven't I seen this somewhere before? The Color Kinetics lighting system performs flawlessly. But it is reminiscent of building façade projects in New York City and Chicago. The exterior of Skyspace is not Turrell at all, but rather, a well-executed commercial lighting demonstration.

Since architectural lighting is the manipulation of light and perception, a blurring of the distinction between Turrell's art and the modern profession of lighting design was overdue. Turrell has envisioned and pursued the unfolding ability to control light so successfully as to make light-based perceptual psychology and perceptual art possible. But equally, for those of us who design buildings, it is a reminder and inspiration of the capabilities of light and space, and the extent to which, through design, we can affect perception. ■

TURN TO PAGE 47 FOR INFORMATION ON FIXTURES AND SOURCES IN THIS PROJECT.

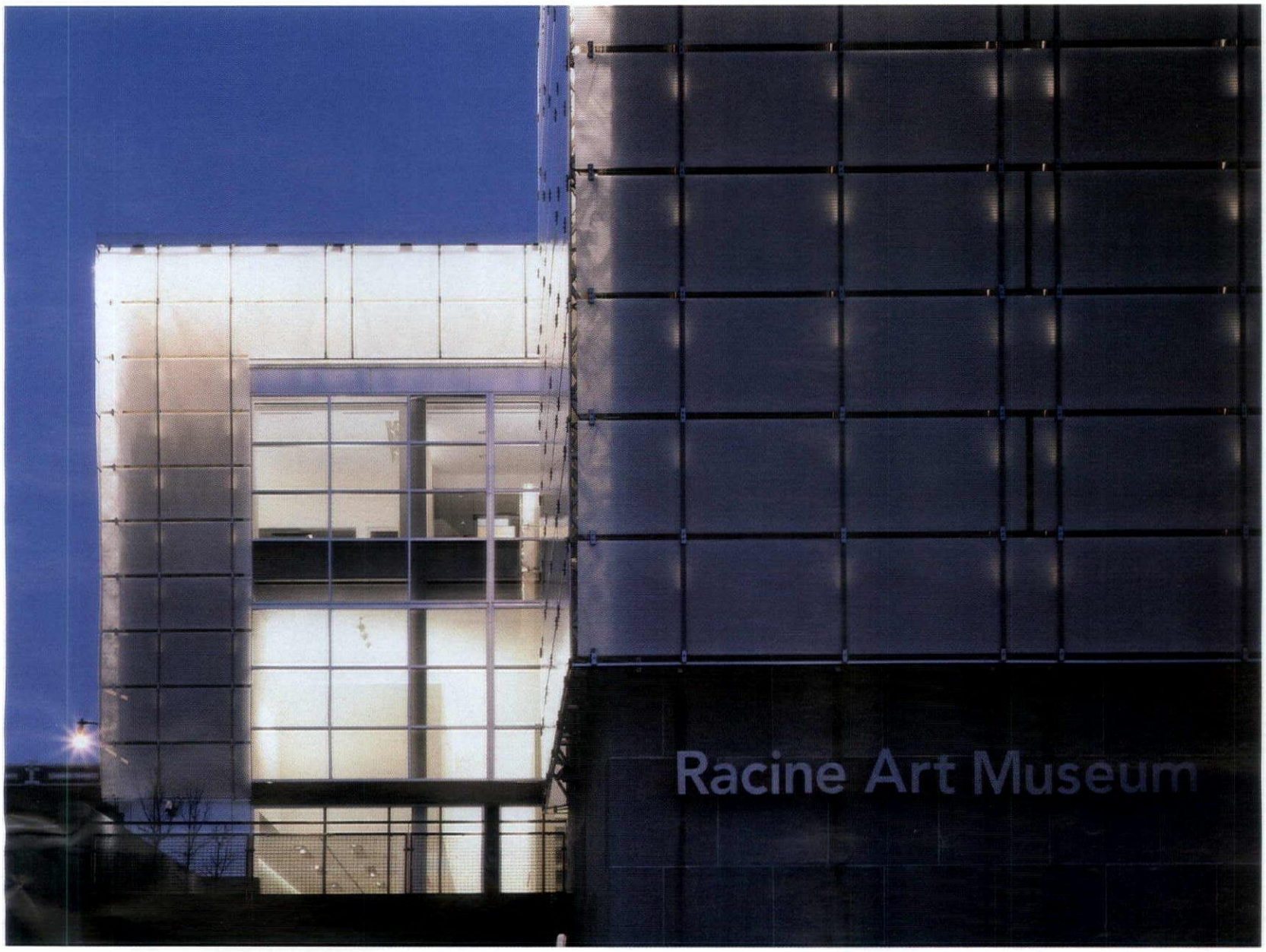
DETAILS

PROJECT *Knowing Light* **LOCATION** Henry Art Gallery, Seattle **ARTIST** James Turrell **CONSULTING ARCHITECT** Donnally Architects **GENERAL CONTRACTOR** Krekow Jennings **PHOTOGRAPHERS** Lara Swimmer (*Light Reign*); Adam L. Weintraub (*Spread*) **LIGHTING MANUFACTURER** Color Kinetics Lighting

Art Alive

A museum with a glow awakens a sleepy midwestern town.

BY EMILIE W. SOMMERHOFF, EDITOR-IN-CHIEF



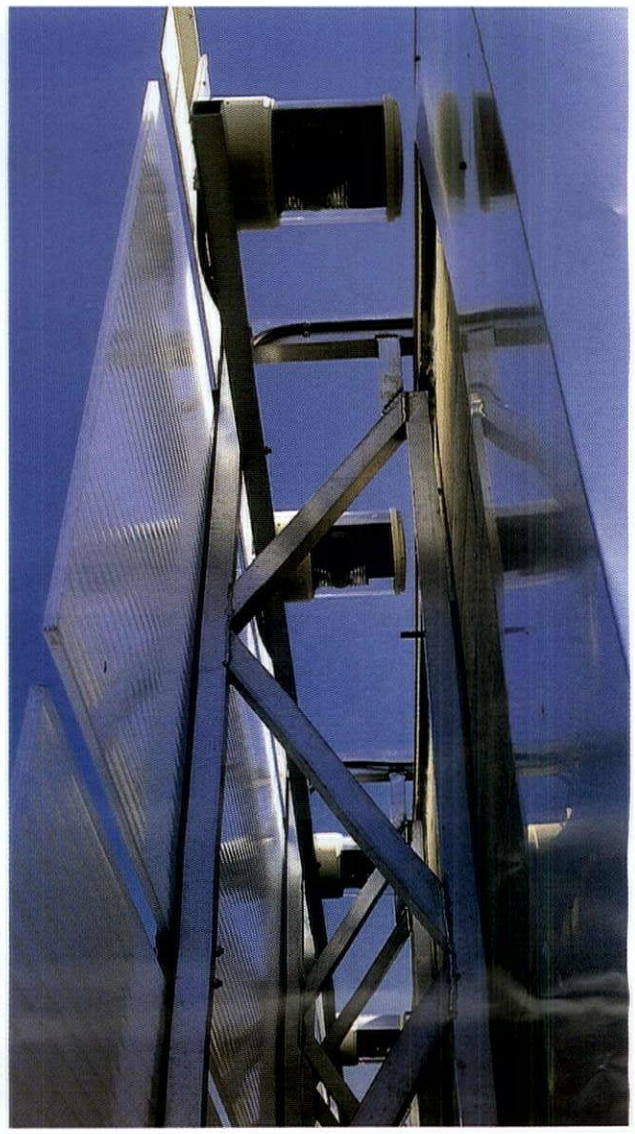
For a little museum (46,000 square feet) in a small town (less than 100,000 residents) that was designed and built on a modest budget ($6.3 million), the Racine Art Museum is getting a lot of attention. (*Architecture*, *Interior Design* and *Metropolis* magazines have all recently published a review of the project.) It could be that the area was already present on the critics' radar screen: it's close to such architectural gems as Frank Lloyd Wright's Wingspread House and Johnson Wax Building. Or perhaps it's because, with exceptionally little to work with, architecture firm Brininstool + Lynch created an elegant building whose contemporary vernacular translates surprisingly well into its sleepy nineteenth-century surroundings.

Moving from the organization's former home in an old farmhouse meant more than just a new facility for its collection of contemporary American craftwork; the relocation also provided an opportunity to infuse color into the canvas of economically fatigued Racine, Wisconsin. That the "new facility" was actually a dreary bank building did not deflate the museum's or the architect's intentions. The team undertook the renovation—and virtual recreation—of the structure, which was in fact two buildings (dating as far back as the 1870s) and several additions behind one façade. The result: a building that lights up the downtown, literally.

BEAUTIFUL SKIN

Indeed, the lighting—for which the firm is also responsible—plays no small role in the museum's presence. With such a small budget, Brininstool + Lynch had to work around much of the existing architecture, including the bulky exterior limestone façade that encased and unified the former structures. Dismantling it would have been prohibitively expensive, so instead the designers dressed it up, wrapping the top two levels on the south, east and west sides of the building with an acrylic material commonly used for greenhouse roofs. Aluminum trusses attach the 4-foot-wide translucent acrylic panels, in various lengths up to 38 feet depending on where they fall in the running-bond pattern, to the limestone façade. A distance of 18 inches between the wall and paneling leaves space to further enhance the unique treatment.

The exterior lighting for Racine Art Museum seems to flow from the building's crown. The museum's interior escapes the opaque acrylic skin through a three-story window wall that surrounds an outside courtyard (above). Inside, a laylight provides ambient illumination, while track fixtures light the museum's collection of contemporary American craftwork (facing page).



To create the museum's glowing nighttime presence, architecture firm Brininstool + Lynch mounted acrylic panels to the original façade, backlighting them from above using a fixture with a special optical system for an even beam spread (above right).

"Somehow we wanted to light the panels and make them glow," says Brad Lynch, the partner in charge of the project. During the day, natural light interacts with the limestone surface behind the slightly ribbed acrylic to give the building an iridescent sheen. The architect wanted the museum to stand out just as well at night—but not in the flashy Times Square fashion. "We wanted it to have a lantern-like quality."

The façade is illuminated from the top down, with the fixtures set behind and attached to the acrylic sheets at approximately 8-foot intervals. (Lighting the panels from the front would have created glare and reflection, not the gentle illumination the architect wanted; plus, visible lighting equipment would have adulterated the acrylic skin.) Finding the right luminaire for this angle proved difficult; the team tried almost 20. "Because of the fixture casing, you normally have a conical-shaped flow of light," says Lynch. "Our goal was to light the top as evenly as possible." The team tested fixtures using a vertical five-panel mockup, photographing the various scenarios to determine the gradation of light and how far down the façade the glow traveled, which Lynch felt would be easier to see on film. They finally decided on Bega's Vertical Surface Illuminator, whose cylindrical lense helped eliminate the conical hotspot. The fixtures are fitted with 150W ceramic metal halide lamps.

The effect is enchanting. The horizontal panels intersect with the façade's vertical unistrut supports, creating a pattern that, when washed with light, suggests a delicate metallic mail. There is also the impression of movement. The light gushes brightly from the roof and down the wall to pool on the first floor, where the illumination through the clear, full-height windows glows more intensely. The eye is caught in this movement and carried toward the building's ultimate purpose: the artwork displayed behind the street-level fenestration.

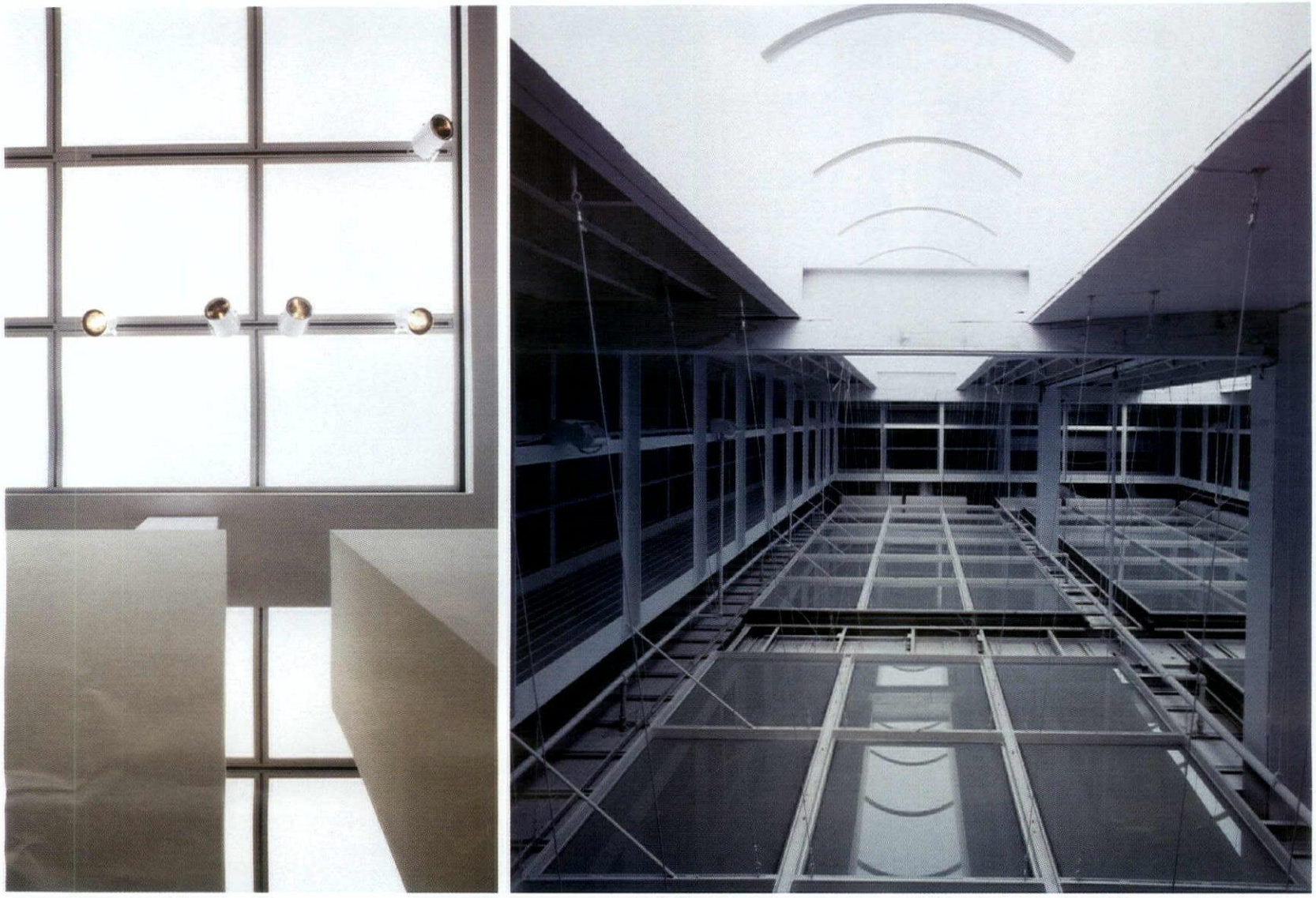
QUIET LIGHT

Inside, the lighting is more subdued, integrating modestly with the structure to enhance it and the artwork it houses. Working with the existing architecture, Lynch lowered the ceiling in most of the rooms in order to conceal mechanical and electrical services and "to change the volumetric shape of the space." One of the first-floor galleries is open to the street—and lots of sunlight—with an entire south wall of full-height glazing; the other gallery exhibits more light-sensitive objects and, therefore, is windowless.

To light large circulation zones, Lynch tucked 17W T8 fluorescent lamps in soffits; track lighting—which, in many cases, was hidden in slots in the ceiling—illuminates areas dedicated to art display. Track fixtures house incandescent PAR lamps, which vary in size, wattage and beam spread depending on the throw distance and object in question. The lamps are individually dimmable and include a UV-blocking glass filter to protect the artwork. (The museum's inaugural exhibition featured Dale Chihuly's sculptures in glass, a medium that is not particularly sensitive to environmental conditions; for this, the installation designer substituted low-voltage halogen lamps for a brighter light level.)

Keeping equipment out of sight as much as possible was important to Lynch. "We didn't want people walking into a space and seeing a light fixture," he says. Recessed cans—which Lynch refers to as "ceiling acne," a term he attributes to architect Robert Stern—are used sparingly to light public areas with a lower ceiling height. Here, the eye is less likely to be drawn upward. In large open spaces, explains the architect, the natural tendency is to look up, as one does, for example, in a cathedral.

A steel-framed glass laylight punctuates the 18-foot-high ceiling in the third and last gallery on the second floor. Set 8 feet below a roof-height acrylic skylight and



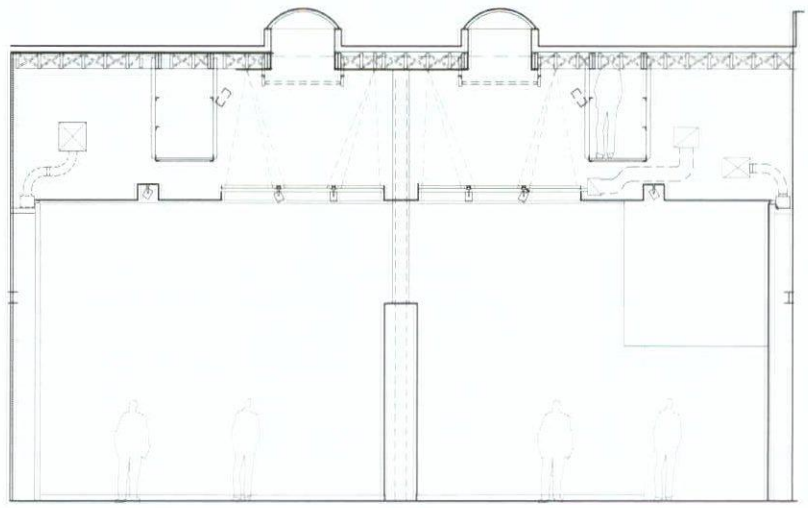
The 8-foot-high space above the laylight in the second-floor gallery (above right) is painted white to improve the light levels below. Acrylic skylights provide backlighting by day; metal halide floods fill in at night. From below, the wires and other structural details are invisible (above left).

hung from the structure by wire, the 22-foot-by-44-foot laylight can deliver both natural and artificial light to the space below: 150W T6 ceramic metal halide floods provide backlight in the absence of sun. Track fixtures are set both into ceiling slots around the laylight and into laylight's steel frame. As in the other galleries, a dimmer panel in the room controls the electric lighting levels. This gallery, however, hosts traveling exhibits and UV-sensitive art, so natural light also had to be controllable. The laylight's laminated, translucent glass incorporates UV-protectorate film. The acrylic skylight also blocks much of the ultraviolet light, but if an exhibit is particularly sensitive, the museum can throw a cover over the skylight. "We didn't have money to do a mechanical shading system, so basically we use black polyurethane plastic," says Lynch. "We call it the Hefty-bag solution."

Where visible, the designers managed natural lighting more elegantly. The three-story window wall around an exterior courtyard on the building's south side is equipped with a shade to control glare and heat. When not in use, the shade hides in the ceiling. A dot-matrix pattern tints the windows on the upper two floors, and all of the glass throughout the building is treated with a UV coating.

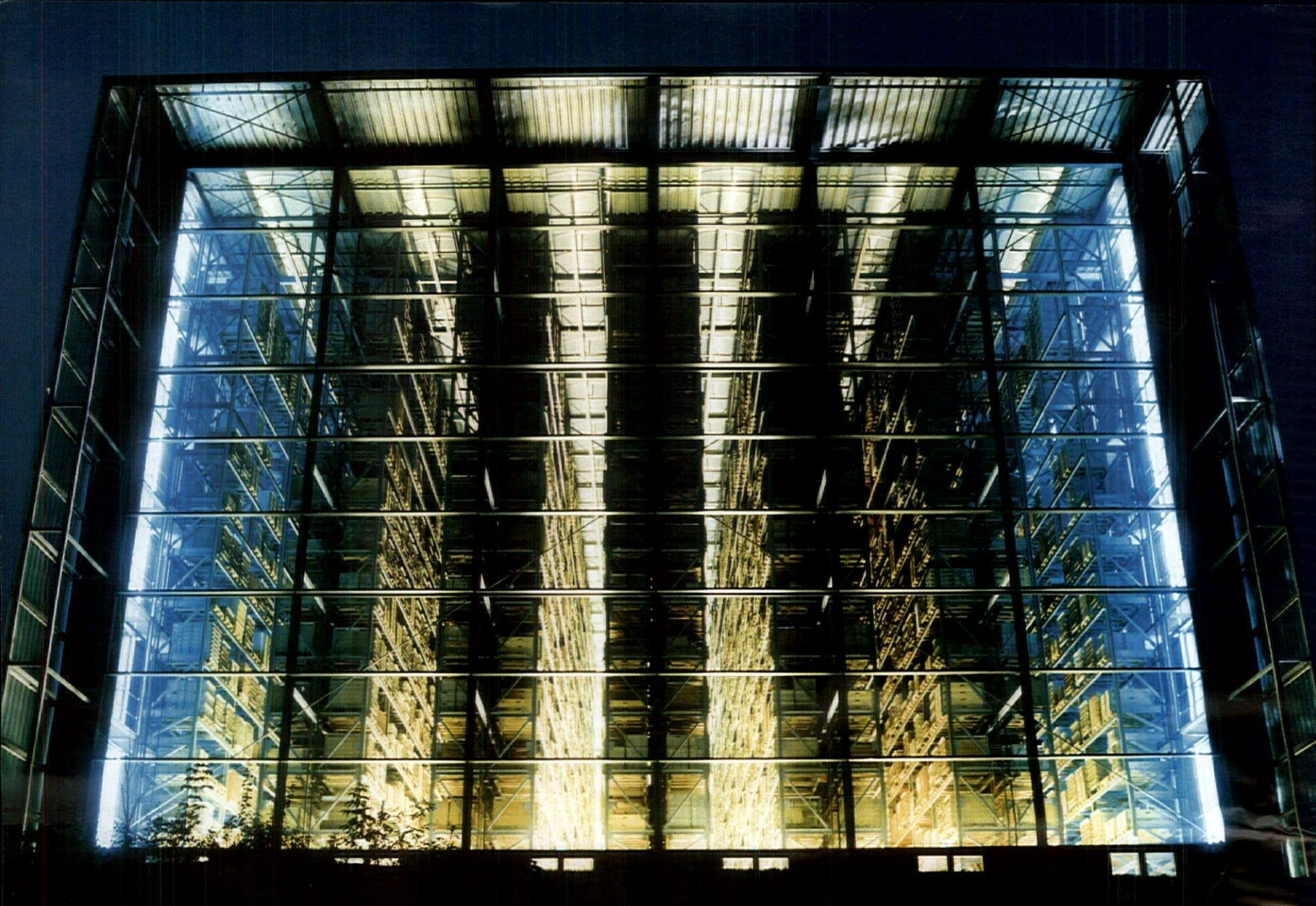
Lynch is conscious of the role and presence of lighting in his projects: "It's something I've always played with. It's been experimentation, about what works for us, and a lot of it has had to do with economy." Practice, as they say, makes perfect: Racine Art Museum exemplifies lighting as a persuasive force capable of conveying the energy and personality of a building. More important, however—to smaller projects, at least—it proves dynamic lighting can be achieved even on a modest budget. ■

TURN TO PAGE 48 FOR INFORMATION ON FIXTURES AND SOURCES IN THIS PROJECT.



DETAILS

PROJECT Racine Art Museum **LOCATION** Racine, Wisconsin **ARCHITECT** Brininstool + Lynch, Chicago—Brad Lynch, David Brininstool, Pablo Diaz, Daniel Martus, Christine Marsal Brandl, Jason Longo, Mollie Buhrt, Joanna Dabek, Kevin Southard, Matthew Reiskin, Kristen Rozycki **ELECTRICAL CONTRACTOR** Rewald Electric **PHOTOGRAPHER** Chris Barrett/Hedrich Blessing **LIGHTING MANUFACTURERS** Bega, Lighting Services Inc, H.E. Williams, Duray Inc., ETC, Lucifer Lighting Company **OTHER MANUFACTURERS** Deglas (acrylic paneling); MechoShade Systems (shades)



Industrial Theater

A warehouse puts on a show that defies its architectural genre.

BY EMILIE W. SOMMERHOFF, EDITOR-IN-CHIEF

Industrial architecture could speak volumes about our culture—if we let it. Most of the factories and warehouses, however, that produce and store the commercial artifacts of our time are characterless buildings that seem ashamed of their own structure and purpose. The crude, window-impoverished exteriors hide their innards, while slinking themselves into the anonymous grayness of the industrial landscape.

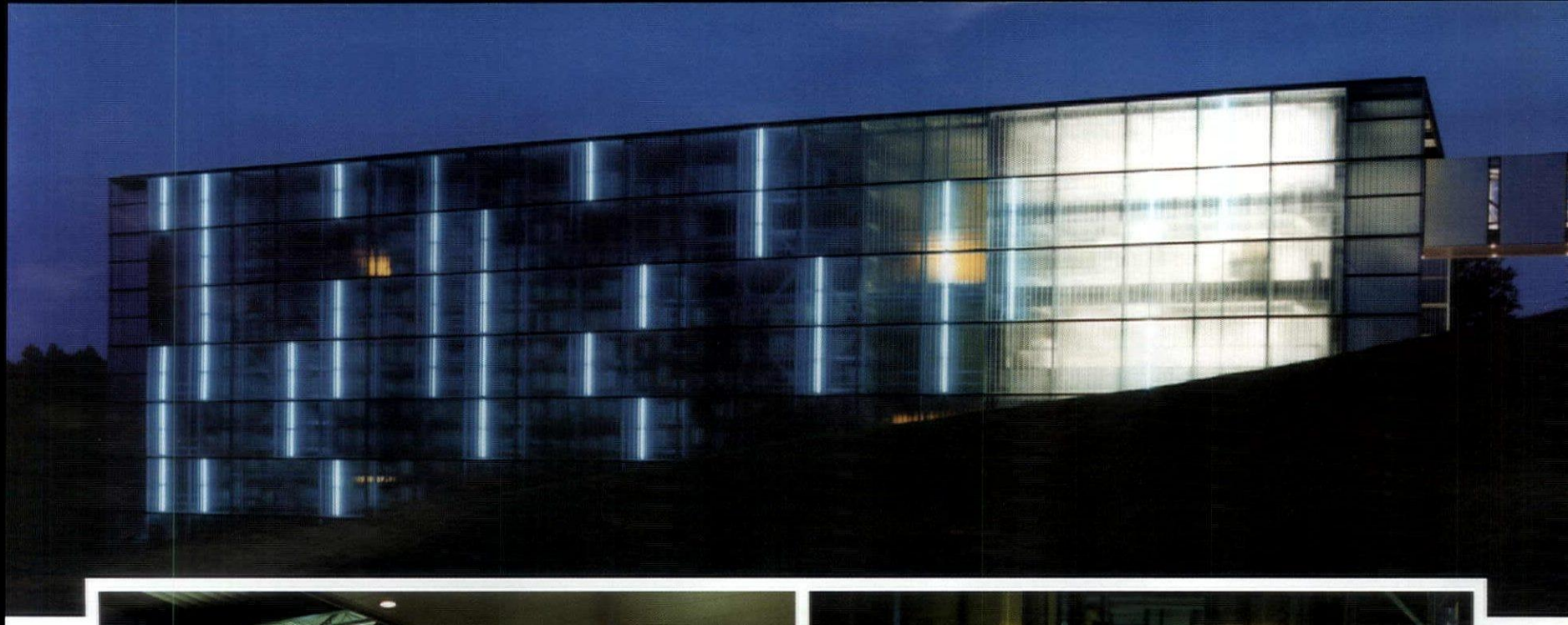
In Lüdenscheid, Germany, lighting manufacturer Erco has freed itself of the confines of this typology. The company's recently completed automated high-bay P3 warehouse not only announces its inner function confidently through a translucent shell, but its architecture and lighting design transform a 7,000-pallet-capacity warehouse into a theatrical performance.

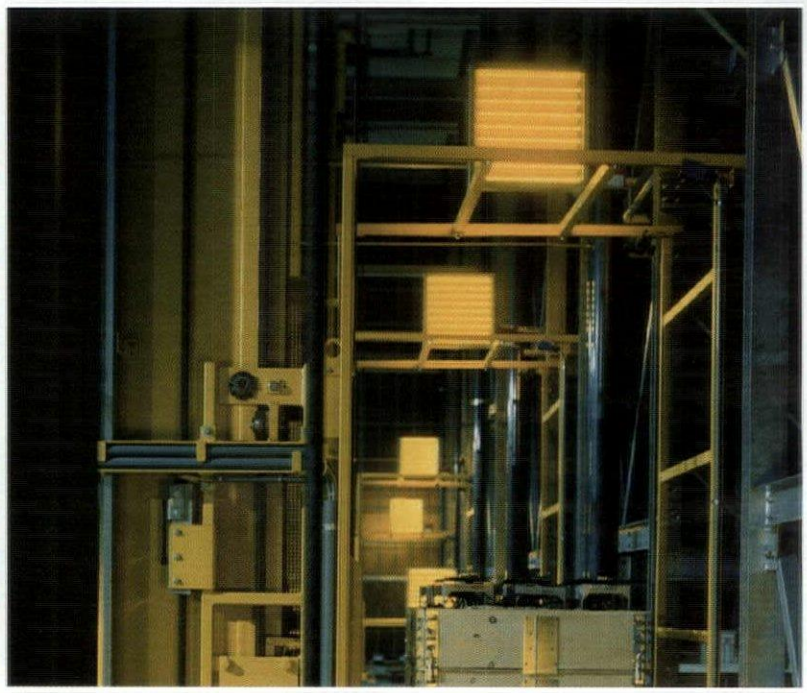
For the architecture firm Schneider+Schumacher and lighting designer Uwe Belzner, Erco's pallet warehouse was an opportunity to confront the "Blechhütten" that represent traditional industrial architecture. "These storage buildings are spread over the world; their structures are expressive, but completely hidden," says architect Till Schneider. "We wanted to bring the working machines and inner life to the façade." Erco's P3 facility is completely penetrable visually: The northeast and southwest sides are clearly glazed. The loading dock and control rooms are apparent from the southwest end, while the northeast angle offers a straight-on view into the heart of the building—the pallet racks and six narrow aisles in between that guide the automated stacking cranes. A translucent glass, cast with a shallow U-profile, clads the facility's longer sides. The pattern and opacity of this material expresses the inner workings of the building with a subtlety that heightens the impact of its clearly glazed ends.

The façade sets the stage, but it is the lighting that allegorizes the warehouse's internal drama, and the language used to convey this tale is the industrial alphabet of barcode. "Everything that is inside—the computers, robots and materials—works with barcodes. This is a huge scanner machine," says Belzner.

Nothing could be more symbolic of P3's contents or purpose, so the lighting designer replicated the barcode motif on the glazed skin. Like the goods stored in the building, the 230-by-75-foot façades present vertical lines of, not ink, but T26 58W fluorescent tubes in blue-green color-filter sleeves that seem to change their configuration—and their meaning—at regular intervals. Two lamps stacked vertically end on end are controlled by one dimmer circuit (280 lamps and 140 dimmers, in total); these are dimmed and switched to illustrate different themes from the world inside, such as stacking and rearranging. The building skin is programmed for more than 200 different scenes. The warehouse's function is further expressed with 16-inch-square orange LED panels that, set atop the stacking cranes, narrate the movements of the automated machines. Outside, the cranes can be seen zipping along the aisles, stacking and retrieving. "Since these movements are not in the program, theoretically the façade always looks different," says Belzner, "like the sky."

Despite its innovative aesthetic, P3 is not out of costume. Both architect and lighting designer emphasize that they specified materials familiar to this kind of architecture; it is the application that is unusual. The translucent cladding is normal





This warehouse for lighting manufacturer Erco expresses its inner life through the façade. The short ends are clearly glazed, exposing control rooms from the southwest (above) and aisles of pallet racks from the northeast (facing page). The racks also serve as the building's structural system. U-profile glass clads the longer sides, providing diffuse light to the interior during the day (right). At night, fluorescent tubes in color-filter sleeves simulate the barcodes that control the automated activity inside (top). LED panels on the robotic cranes (above right), visible from the outside, also narrate the industrial environment.

industrial glass turned inside out so the U-profile faces the exterior. "By turning this, we brought a special character to the outer façade. The reflection of sunlight is completely different," says Schneider. With this effect, natural light becomes as active an element in the design as the artificial lighting treatments.

As an architectural lighting manufacturer, Erco has a vested interest in demonstrating what its products can do for a building. But this project was also an opportunity to reiterate its appreciation for high-quality lighting and architectural design, and its belief in the integration of the two. Atypically, the structure is in many ways influenced by the lighting requirements, since both architect and lighting designer were brought on in the beginning. The building's 75-foot height, for example, correlates directly with the length of the fluorescent tubes.

Even more than most good architecture, this building is intended for the experiential pleasure of those on the outside; only three Erco employees actually work in P3. Landscaped by Bernhard Korte, the facility is situated on one side of a little valley, and is visible from a road through the vale and from the opposite slope. Indeed, the warehouse has become a kind of drive-in theater for local residents. The reviews, however, are farther reaching, with two thumbs up from the IALD in the form of a 2003 Award of Merit. ■

TURN TO PAGE 50 FOR INFORMATION ON FIXTURES AND SOURCES IN THIS PROJECT.

DETAILS

PROJECT Erco P3 warehouse **LOCATION** Lüdenscheid, Germany **ARCHITECT** Schneider+Schumacher, Frankfurt am Main, Germany **LIGHTING DESIGNER** Architektur Licht Bühne, Heidelberg, Germany—Uwe Belzner **LANDSCAPE ARCHITECT** Bernhard Korte, Düsseldorf, Germany **PHOTOGRAPHER** Jörg Hempel Photodesign **LIGHTING MANUFACTURERS** Erco, Osram Sylvania

Corporate Comfort

A vocabulary of lighting elements gives a large headquarters building in Texas a human scale.

BY ELIZABETH A. DONOFF, MANAGING EDITOR

At this headquarters building, lighting treatments help define and distinguish areas within. An elliptical covelight with compact fluorescent lamps (facing page) coordinates with interior architectural elements to identify break areas. A similar technique is used to mark elevator lobbies (above). Glass panels enclosed in stainless-steel frames and backlighted with an indirect fixture and baffle further enliven these spaces and turn arrival at the lobby into an event. The connecting stair (left) set against Sandsaba limestone from central Texas utilizes a combination of lighting techniques to accent the stone and take advantage of natural and artificial light sources.

BALANCED LIGHT

Bos Lighting Design was brought aboard during the design development phase of the project to work with HKS and Gensler. "Our main objective was the quantity, quality and balance of light between the combination of natural and artificial light sources throughout the project," explains John Bos, principal of Bos Lighting Design.

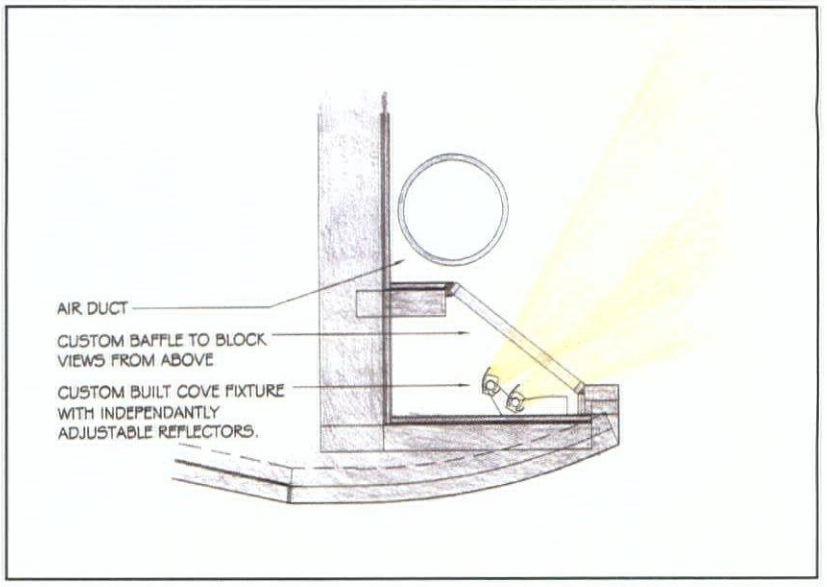
In an effort to create an inviting workspace, the designers conceived of a series of architectural ceiling devices that incorporate lighting elements to provide a sense of scale, and to serve as a visual guide for locating oneself within the large floor template. In the break areas, an energy-efficient compact fluorescent curveable fixture lights an elliptical cove. This form reappears in the elevator lobbies, and even the pizza oven in the servery becomes a sculptural focal point with the addition of a fluorescent cove and incandescent accent lights.

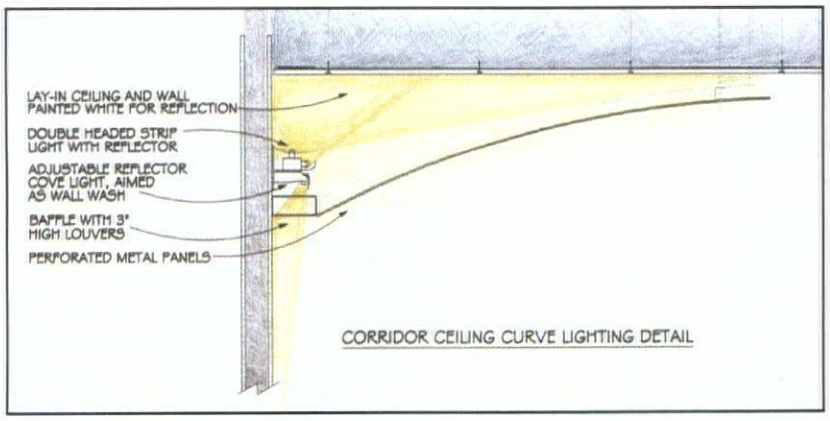
According to Shelton, an equally important design factor is the building's response to the vernacular architecture of Texas and the state's native landscape palette; hence the decision to bring outdoor elements such as stonework into the building, and the selection of earth tones for furnishings and finishes. Connecting stairs between floors are set against Sandsaba limestone walls quarried from a town by the same name in central Texas. The walls had their own lighting challenges. The design team tested full-scale mockups to evaluate the stone pattern and lighting effects. "A large skylight above the stair was throwing 6500K light on the stone during the day," explains Bos. "This is an extremely warm tone, and we had to decide whether or not we wanted to push the daylighting effect or introduce a cooler range of light." To explore cooler tones, the designers experimented with a metal halide lamp and colored filters. The final lighting included a combination of lighting techniques. In-ground uplights during the day, and a combination of uplights and downlights at night provide a glare-free, hidden lighting system for the stair, while highlighting the tone and texture of the beige and ochre limestone.

Each space in the building presented its own obstacles. In the dining area, the height and size of the space and the presence of natural light again raised the critical issue of "balance." The designers needed to create a footcandle level that would not overwhelm occupants, while evenly distributing light throughout the vast space. To achieve an even beam spread over the 30-foot clerestory trusses, Bos employed a double-headed high-output T5 directional lamp with a common ballast. (Modifying this standard lamp proved so successful that the manufacturer, Elliptipar, has incorporated the modified fixtures as a standard option in its product line.) Bega street lights were used to reinforce the ambient light levels and continue the theme of bringing the outdoors inside. Other lighting elements became sculptural components: for instance, the

Of the many aspects involved in the design of large corporate facilities and their interiors, transforming generic office space into a dynamic work environment may be the most challenging. One element that can distinguish a project is lighting. In the case of this rural Texas headquarters, architect and lighting designer have collaborated to use lighting as a spatial definer, creating a comfortable and efficient work setting in the process. The 615,000-square-foot facility serves 3,300 employees, and although the majority of staff works a traditional nine-to-five day, there are several shifts that keep the building up and running through the night.

"The design direction for the building was developed during a three-day charrette between ourselves, the owner, the base building architect HKS, and the landscape architect SWA," explains Gensler project architect Thom Shelton. The building houses the programmatic spaces one would expect to find in a corporate headquarters—offices, an auditorium, training facilities, conference rooms, a gym, and a dining area—but it is the way in which the spaces are organized in the pinwheel-shaped building that differentiates the facility from a traditional office building. Upon arrival through the main entrance, one immediately overlooks the dining area and out beyond to an adjacent meadow. "The client focused a lot of attention on the dining area," says Shelton. "They wanted employees to be able to use this space throughout the day, and feel that the building was an extension of the landscape."





Natural and artificial lighting elements work in concert throughout the building. In the dining area (top left), the double-headed lamp and reflector cove detail (top right), along with Bega street lighting and custom metal-fin spotlight accents at the condiment stations, are used to balance the overall footcandle level. The perimeter corridor (above) and its cove detail (above left) reinforce the linear aspect of the open-area workspace and act as a wayfinding device, indicating to occupants that they are near the elevator core.

condiment station features a curved metal-fin panel wrapped in fabric and uplighted with three low-voltage spotlights.

The lighting scheme for the open-plan work areas confronts the ongoing dilemma between efficiency and aesthetics. After reviewing several layouts with the client, Bos found that locating fixtures perpendicular to the interior walls was the most effective solution because it helped foreshorten the over-400-foot-long space. Running the fixtures in the same direction as the interior partitions would have accentuated the building's length, and the designers were already trying to moderate the scale of the floor plan. Luminaire types work in concert with Gensler's system for the demountable office partitions: Recessed and indirect fixtures light locations with floor-to-ceiling partitions; pendant fixtures uplight the open cubicles for a glare-free environment.

The open-plan layout also features wide perimeter aisles, part of the client's policy that shared public spaces be within proximity of natural light. To balance the light from the window wall with illumination from the aisles that fall along the interior core walls, Bos combined two fixtures encased inside a curved ceiling component—a wallwasher and a striplight. The combination of the two creates a spread of light along the wall and a glowing effect for the curved panel. It also functions as a wayfinding technique. In this instance it tells occupants their proximity to the elevator core.

EFFICIENT BUSINESS

The lighting design had a practical side, too. Certain decisions were client driven, such as the choice to use indirect lighting with a color temperature of 3000K in many of the spaces, a common practice now that employers are increasingly aware of the relationship between good lighting design and worker productivity.

Given that its 615,000-square-foot-facility operates around the clock, the client's concern with long-term operating costs is not surprising. There is 12,000 feet of indirect lighting in this building, and Bos found different lamps and spacing arrangements could help reduce energy costs and usage. In the open-plan work areas, two 32W T8 lamps achieve the same light output as one 55W T5 lamp, resulting in a savings of approximately 15 percent and a three-year payback period. In addition, photometric studies allowed for a 12-foot center-to-center fixture placement rather than the traditional 10-foot arrangement, reducing the total number of fixtures.

This project confirms that lighting should not be overlooked as a component of the design process. A collaborative effort between architect and lighting designer led to innovative solutions, in which lighting gives spatial and experiential definition, and in the process enlivens a building that could have otherwise taken a very mainstream approach to corporate headquarters design. ■

TURN TO PAGE 52 FOR INFORMATION ON FIXTURES AND SOURCES IN THIS PROJECT.

DETAILS

PROJECT corporate campus (name withheld by owner) **LOCATION** Texas **BASE BUILDING ARCHITECT** HKS, Dallas **INTERIOR ARCHITECT** Gensler Associates, Dallas **LANDSCAPE ARCHITECT** SWA, Dallas **LIGHTING DESIGNER** Bos Lighting Design, Houston **PHOTOGRAPHER** Paul Bardagjy **LIGHTING MANUFACTURERS** Bega, Belfer, Elliptipar, Kurt Versen, Peerless, and Tech Lighting.

control

BRIGHT, COOL & IN

At Altman, we know what it means to perform.

Take our new Spectraseries™ indoor/outdoor PAR. It works just like a regular PAR. But with Chromacore® technology from Color Kinetics, it also offers millions of colors, remarkable brightness and non-stop performance. You can vary the colors — continuously — and without dimmers. And the SpectraPAR™ keeps working (and keeps its cool) no matter what.

Now you're free to focus on lighting, not lights. You've got the ability to connect art and audience. Define structure and space. Make dramatic statements like never before.

On with the show.

Fifty years of stage lighting innovation taught us one thing: nothing beats a spectacular performance.

Visit **www.altmanlighting.com/spectra** or call 800.4.Altman.

Circle No.92 on reader service card

Spectraseries™ technology gives you 16.8 million colors and on-the-fly control — in a bright, maintenance-free luminaire.

- *ultra-long life*
- *three interchangeable PAR lenses: narrow spot, medium flood, and wide flood*

COLOR KINETICS CHROMACORE®

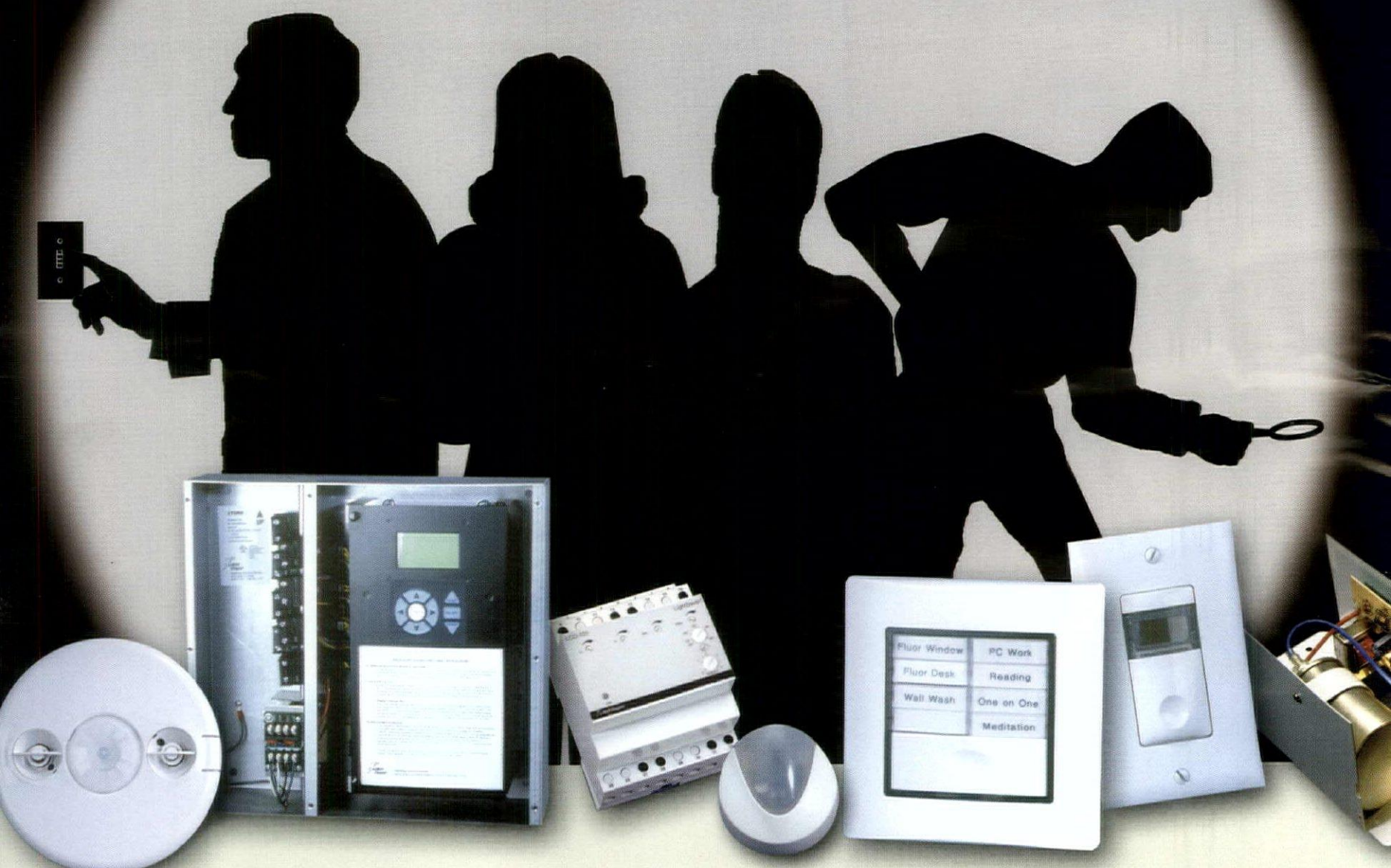
ALTMAN Lighting, Inc.

BRINGING IMAGINATION TO LIGHT

OCCUPANCY **SENSORS** | LIGHTING **CONTROL PANELS** | DAYLIGHTING **CONTROLS** | TIME AND AUTOMATIC **SWITCHES**

"SOLVED!!!"

The Watt Stopper



Energy Code Mysteries

CODE COMPLIANCE ISSUES ARE NO MYSTERY TO THE WATT STOPPER'S TEAM OF EXPERTS. COMPREHENSIVE CODE-COMPLIANT LIGHTING CONTROLS! EXPERTISE TO HELP YOU AT EVERY STEP OF YOUR PROJECT! ONLY A PHONE CALL OR MOUSE CLICK AWAY, WE'VE GOT ANSWERS TO YOUR PUZZLING CODE QUESTIONS

MEET - AND BEAT - CODE REQUIREMENTS.

Circle No. 27 on reader service card

CCLC | Rated CCLC | Code Compliant Lighting Controls

800.879.8585 • www.wattstopper.com

the Watt Stopper®

Lighting and Productivity: Missing Link Found?

BY CRAIG DILOUIE

Lighting designers claim to provide value in many ways, one being based on the belief that lighting design influences worker satisfaction and motivation. They're right. The Light Right Consortium has completed a new study indicating that office workers appreciate quality lighting and have preferences consistent with prior research in this area. In the study, subjects demonstrated greater satisfaction with a direct/indirect scheme that includes wallwashing at the perimeter—and even greater satisfaction, as well as improved motivation, with the addition of personal control—versus traditional approaches. This research is particularly noteworthy because it is one of the first scientific studies to comprehensively address lighting quality.

As its findings are likely to be translated into broader lighting design practice, the study has a strong potential to deeply impact how facilities are lighted in the future.

LIGHTING AND PRODUCTIVITY

We know that lighting affects people psychologically and physiologically. Between 80 and 85 percent of our impressions of the world are visual: Light makes sight. Perception, however, depends on how a space is lighted: Lighting also makes perception. And perception, as the saying goes, is reality. Americans spend an average of 80 percent of their time indoors. This means the lighting that shapes people's predominant perception of the world is electric—created, designed and controlled by humans.

The lighting design profession has long claimed that some lighting approaches are better than others—giving rise to the term "lighting quality"—and that better approaches can lead to greater worker morale and satisfaction, along with improved corporate image, tenant/employee attraction and retention, building valuation, security, retail sales and so on.

Today, it is more difficult to assess worker output (the proverbial "widgets per hour") in offices, making worker satisfaction and motivation a more important metric of productivity than it was once considered. A 1996 study reported in the *Journal of Occupational Health Psychology* found that job satisfaction accounted for 63 percent of variance in organization commitment, which accounted for an 80 percent variance in intent to turnover; in that study, job satisfaction incorporated satisfaction with the physical environment. A 1987 study in the *Journal of Applied Psychology* reported that workplace characteristics accounted for a 31 percent variance in work satisfaction.

THE LIGHT RIGHT CONSORTIUM

The Light Right Consortium is managed by the Pacific Northwest National Laboratory and operated by Battelle for the U.S. Department of Energy.

Board members include the Alliance to Save Energy, the Illuminating Engineering Society of North America, the International Association of Lighting Designers, the International Facility Managers Association, Johnson Controls, the National Electrical Manufacturers Association, the New York State Energy Research and Development Authority, Steelcase, the U.S. Department of Energy and the U.S. Environmental Protection Agency.

The organization's goal is to transform the lighting market by using research to investigate the link between lighting quality and the performance, satisfaction and productivity of workers.

In 2003, the Light Right Consortium announced the results of a landmark field simulation study indicating a causal relationship between lighting quality and worker satisfaction and motivation. The actual study was conducted under contract with the Lighting Research Center at Rensselaer Polytechnic Institute and National Research Council Canada's Institute for Research in Construction.

Project sponsors who contributed equipment included Armstrong, Birchwood Lighting, Cooper Lighting, Day-Brite Lighting, Engineered Lighting Products, General Electric, Ledalite, Lightolier, Lutron, Osram Sylvania, Peerless Lighting and Philips Lighting.

While owners may be interested in better lighting, they may not actually choose to install it unless they believe that it can be measurably beneficial for their workforce. The three (interrelated) barriers to adoption of quality lighting are initial cost, a lack of scientific evidence indicating a link between lighting quality and human performance, and the inability to predict the financial benefits of increased occupant satisfaction.

The Light Right Consortium was formed in 1998 to tackle this problem. "Central to the success of the Consortium is establishment of a link, based on sound research results, between quality lighting and economic benefits," notes Carol C. Jones, LC, program manager. "Market transformation goals include: influencing customer decisions so that they design, purchase and install higher-quality and more energy-efficient technologies; going beyond the technology issues to delve into the dynamic of customer and market behaviors; and creating enduring market changes."

DECISION-MAKER PERCEPTIONS

The Consortium's first step was to identify perceptions and barriers among decision-makers via an independent market research study. The first portion of the research investigated the dynamics of the lighting market. Then a survey was conducted of decision-makers that own and use lighting systems. (See figure 1.) More than 90 people were interviewed to define market dynamics and to establish the "value" chart. Another set of interviews of more than 100 people was conducted, resulting in data about customer satisfaction, budgeting process and flexibility, willingness to make changes in purchasing and more. Respondents were balanced across each professional category for statistical validity.

Decision-Maker	Perceived Value of Lighting Quality	Authority of Lighting Decisions				Frequency of contact with Project
		New		Renovation		
		TO	OO	TO	OO	
Owner	1 (TO) or 2 (OO)	5	5	3-4	5	5
Architect	2	3	4	3	3	4
Engineer	1-2	3	4	3	3	4
General Contractor	1	2	2	2	2	5
Lighting Designer	5	4	5	4	5	2
Interior Designer	4	3	4	3	4	1
Facilities Manager	4	3	4	3	4	3-4
Electrical Subcontractor	3	1	1	1	1	4
Occupant	5	1	1	4	1	1

TO - Tenant Occupied OO - Owner Occupied *Note: Scale is 1-5, with 5 being highest*

FIGURE 1. The Light Right Consortium conducted a survey of decision-makers to gauge their influence on lighting decisions and their perception of the value of lighting quality.

The base-case scenario for the field simulation involved a regular array of three-lamp parabolic louvered luminaires and no personal dimming control (left, top and bottom). The "best practice" version included suspended direct/indirect luminaires and perimeter wallwashing, also without dimming control (right, top and bottom).

According to the study, though lighting designers have a high level of influence in lighting decisions during the planning stage, they have limited frequency of contact with the project, probably owing to less involvement during the overall construction process.

Electrical contractors have low authority over design decisions because they don't specify products, but they do have a high frequency of contact with the project. Previous research has shown that, while they do not make direct decisions regarding the initial lighting design, their involvement with the project allows them to influence the owner regarding what is actually installed during the construction phase through substitutions, scheduling and cost interactions.

The owner is the only decision-maker that has both high authority and frequent contact with the project. What is notable and important is that owners perceive the value of lighting quality to be low. This is because, in their minds, the value has yet to be proven in concrete and economic terms, and because education of owners about lighting quality is limited.

These results tell a story that depicts a major ongoing problem in the industry. Architects either design their own lighting or bring in lighting designers for their expertise, but this expertise may be compromised by tough budget decisions—via substitutions approved by the owner—late in the construction process. The owners approve these substitutions and subsequent design compromises because of a low perceived value of the benefits of quality lighting.

According to the survey, 75 percent of respondents said that if factual evidence indicating a positive effect by lighting on worker productivity were available, it would influence which lighting systems they purchased. The survey further found that 87 percent reported flexibility in lighting budgets if a return on investment could be demonstrated. Additional market research findings showed that respondents reported employee/occupant satisfaction to be even more important than worker output, retention and absenteeism, which gave the Consortium indications on where to focus their efforts next.

THE FIELD SIMULATION STUDY

A research study was set up to address the following question: Can different forms of realistic office lighting affect the performance of office workers or the well-being of employees? The primary variables to be studied included room surface brightness and personal control.

The research centered on a field simulation, conducted in the field but with simulated tasks and a high degree of experimental control that is typical of laboratory studies. (To confirm the results and gain more information, a full field study is being planned for 2004.) An office in Albany, New York, was set up as a typical space for nine workers. The open-office plan featured perimeter windows and access to a view, although translucent window shades were used to alleviate the impact of daylight. The space was planned and furnished to allow the researchers to set up six different lighting designs (defined in figure 2), so that each design appeared to be a permanent installation.

As shown in figure 2, two experiments were conducted to assess worker perfor-

EXPERIMENT 1			EXPERIMENT 2		
Installation 1 **Base Case**	Installation 2 **Best Practice**	Installation 3 **Best Practice + Switchable Control**	Installation 4 **Best Practice + Individual Dimming Control**	Installation 5 **Lensed Troffers**	Installation 6 **Best Practice at 400 lux**
LIGHTING SYSTEMS					
Regular array of 3-lamp parabolic louvered luminaires; no individual controls	Regular lines of suspended continuous direct/indirect luminaires; wallwashing; no individual controls	Regular lines of continuous direct/indirect luminaires; wallwashing; Individual control of 3-level switched desk luminaire (hi/med/low)	Individually dimmed direct/fixed indirect lighting for each cubicle (continuous dimming); wallwashing	Regular array of 3-lamp lensed luminaires; no individual controls	Regular lines of suspended continuous direct/indirect luminaires; wallwashing; no individual controls
WORKPLANE LIGHT LEVELS					
587 lux	562 lux	810 – 2307 lux	287 – 953 lux	540 lux	400 lux
"Overall, the lighting is comfortable." In agreement:					
71%	85%	81%	91%	69%	81%
"The lighting is uncomfortably bright for the tasks that I perform." In agreement:					
33%	21%	21%	11%	35%	15%
"Reflections from the light fixtures hinder my work." In agreement:					
29%	17%	39%	21%	41%	18%
"How does the lighting compare to similar workspaces in other buildings?" Those who said "better":					
24%	53%	39%	50%	21%	27%

FIGURE 2. The field simulation of lighting conditions yielded a selection of subjective results.

Switching and dimming systems from one global resource.

A hallmark of architectural and technological sophistication, the Bank of China, Beijing, utilizes Lutron dimming and switching systems to enhance and highlight its stunning architecture and improve building performance.

Photography by Kerun Ip, courtesy of Pei Partnership Architects LLP.

Lutron lighting controls provide comprehensive dimming and switching solutions for any project, anywhere in the world. Call us at **877-258-8766 ext. 200** or visit us at **www.lutron.com/architecturallighting.**

LUTRON

Lutron controls your light.™

Circle No. 9 on reader service card

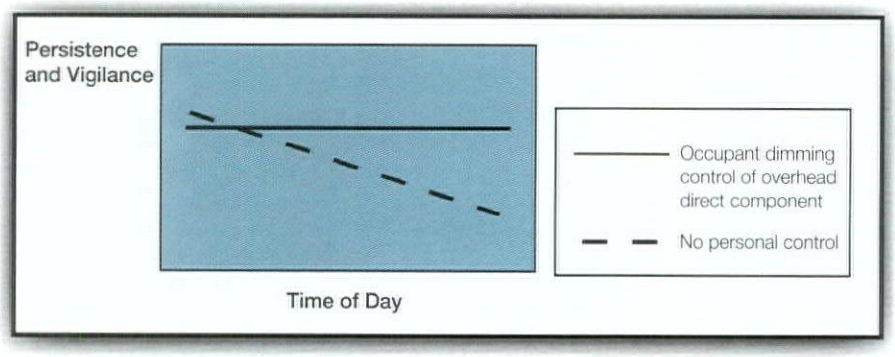


FIGURE 3. Occupants with dimming control experienced increased motivation and were better able to sustain their persistence and vigilance over time, compared to those without any control over their lighting systems.

mance and reactions to various lighting approaches. The workers were temporaries hired to work on more than 15 distinct tasks under different lighting conditions for a typical eight-hour day per condition. The tasks simulated elements of office work, such as data entry and filing. For many of the tasks, measures of performance were taken using custom computer software. At the end of the day, the subjects completed a questionnaire so researchers could determine their impressions of the lighting.

Output measures were collected that ranged from the subjective (occupant opinion) to objective (quantitative performance), resulting in a large data set. Productivity metrics included subjective perceptions, persistence, vigilance, vision, environmental satisfaction and self-rated productivity. Persistence at a difficult or impossible task is an indicator of motivation at the task; vigilance is a state of watchfulness or careful attention, and is related to accuracy.

STUDY RESULTS

Responses to several questions soliciting opinions about the lighting are shown in figure 2. Based on this subjective research and an initial interpretation of the objective findings, the following conclusions can be drawn:

•Direct/indirect fixtures, in addition to wallwashing around the perimeter, is considered more "comfortable" and less "uncomfortably bright" than lensed and parabolic troffers.

•About 70 percent of occupants considered lensed and parabolic troffers to be "comfortable" overall, versus 81 to 85 percent for direct/indirect with wallwashers and 91 percent for the personal dimming control condition.

•People with dimming control showed more sustained motivation and improved performance on a measure of attention. They also reported higher ratings of lighting quality, overall environmental satisfaction and self-rated productivity.

•People who are more satisfied with their lighting rate the space as more attractive, are happier, and are more comfortable and satisfied with their environment and their work.

•Lighting and task conditions that improve visibility lead to better task performance.

"Current lighting practice achieves 'acceptable' levels of comfort, unless we consider 30 percent of the occupant population to be significant," says Jones. "Breaking out of the lighting world for a moment, it is interesting to note that thermal comfort standards consider 70 percent to be below the threshold of acceptability [ASHRAE Standard 55, based on research from Kansas State University]. They require a thermal environment that is acceptable to at least 80 percent of the population. While we don't have similar

martinarchitectural

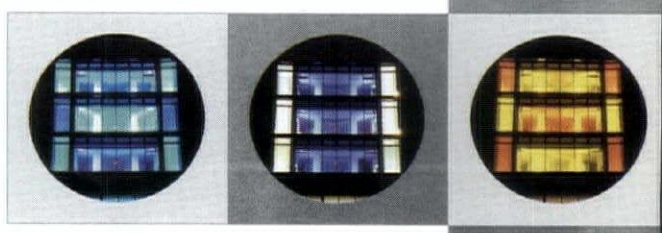
Lighting Design School. Lyon, France.

Alien02

Alien02

Martin offers light
as a living element,
a versatile medium with
infinite possibilities for
modern lighting design.

Designed to the highest
standards in architectural
lighting, Martin's new
Alien 02 is a programmable
luminaire that offers
full-range color mixing.



Martin

www.martin-architectural.com • Tel. +1 954 858 1800

standards with respect to lighting comfort, it's interesting to consider the fact that we can voluntarily meet a higher standard if we choose to, by installing systems that create higher room surface brightness and by delivering personal control to the occupant."

The findings about personal control are significant because they represent a high-value opportunity for owners and tenants. The researchers identified improved motivation as the key mechanism that resulted in increased persistence and vigilance. This finding emerges in an interaction with time over the day (see figure 3), during which persistence and vigilance typically decline. Importantly, the subjects who had individual dimming control of their overhead systems actually sustained their persistence and vigilance throughout the workday, compared to those without personal control.

"At a time when unemployment is high and too many workers are overloaded, any strategy that supports employee motivation should be considered seriously and can translate broadly to the white-collar workforce," says Jones.

Personal dimming of overhead systems also represents a significant opportunity for energy savings. "The cumulative benefit of overhead personal control should not be ignored, nor should we be naïve about the challenge of making the transition into 'intelligent' systems," Jones says. "Our research showed improvements in both preference and motivation, and when that is combined with the energy savings, then the challenge of implementing this new technology becomes far more compelling."

COMPLETING THE TRANSITION

The Light Right Consortium's efforts to date are highly significant for several reasons. The market study is the first research that methodically outlines, for the many participants in the construction process, their authority and frequency of contact with lighting decisions, along with their perceived value of quality lighting. While owners generally do not share other participants' perceived value of quality lighting, many would consider quality lighting to be a higher priority if a return on investment could be demonstrated. It was based on this premise and challenge that the Light Right Consortium initiated its research about how lighting impacts workers.

The study found that satisfaction increases when there is higher brightness on non-task room surfaces and occupants can set workstation light levels to their own preferences. People who are more satisfied with their lighting rate their space as more attractive, are happier, and are more comfortable and satisfied with their environment and their work. This is the first time that this complete path has been demonstrated.

Results showed that more than one in four people are not comfortable with standard lighting. Direct/indirect lighting, in conjunction with perimeter wallwashing and personal dimming, resulted in a greater percentage of the population finding the lighting comfortable. This combination resulted in greater satisfaction and motivation, which can yield economic benefits to the owner in the form of higher morale and greater-quality work output.

As the Light Right Consortium moves into the next phase, it has already accomplished an important goal: starting a dialogue that will likely set a new standard above current practice. The next challenge is a field study in an actual workplace, where organizational productivity metrics (how a group of people performs as an organization) can be collected. As the 2004 field study adds new dimensions to our understanding, the Consortium will be able to further strengthen the case for quality lighting. The ultimate goal is to determine potential financial advantages so that owners consider these benefits when making purchasing decisions about lighting systems. ■

Craig DiLouie is principal of ZING Communications (www.zinginc.com), a marketing communications and consulting firm, and the proprietor of Searchspec.com (www.searchspec.com), a lighting product search engine.

The Birds and Bees of Color Vision

BY FRED OBERKIRCHER

Birds have it.
Bees have it.
Even little fishes in the seas have it.
What is it?
What do they have?

With apologies to a wonderful old Cole Porter song, they have color vision! As a matter of fact, color vision is far more widespread than previously thought. Humans aren't the only ones who have found that color vision provides an environmental advantage. Thirty years ago, a typical psychology text would have stated that it was impossible for mammals that did not share the structure of the human brain to see color. However, advances in physiology and gene research techniques have provided new information that radically changes our view of color vision—both figuratively and literally.

IN THE BEGINNING: BLUE

Research has proven that many different species possess color vision, which raises questions concerning the possibility of some common link, some evolutionary color connection. Interestingly, the bulk of research suggests both an answer to the question and a connection to a current debate within lighting research: Do rods (night vision) also function during daylight conditions?

Looking back through evolution, there is agreement in the scientific community that life probably began in a shallow aquatic environment. Within this setting, the dominant light source was not white—as ours is now—but blue. The first specific task of the visual system in this environment was the discrimination of the blue (lighter and brighter) foreground from the black (darker) background. If we fast-forward, one outcome of the recent research into human genes is the discovery that the cones—which are responsible for daylight (detail and color) vision—are not all the same age. Our "blue" cones are much older than our "green" and "red" cones. They comprise only 8 percent of our cones, saturate at low light levels, are absent from the center of the fovea and are relatively poor at detecting detail. Rods, which share many of the same characteristics of blue cones, are also ancient and blue-light biased. So, it is possible that the common evolutionary connection was a blue-biased aquatic environment that supported the development of blue-based vision systems.

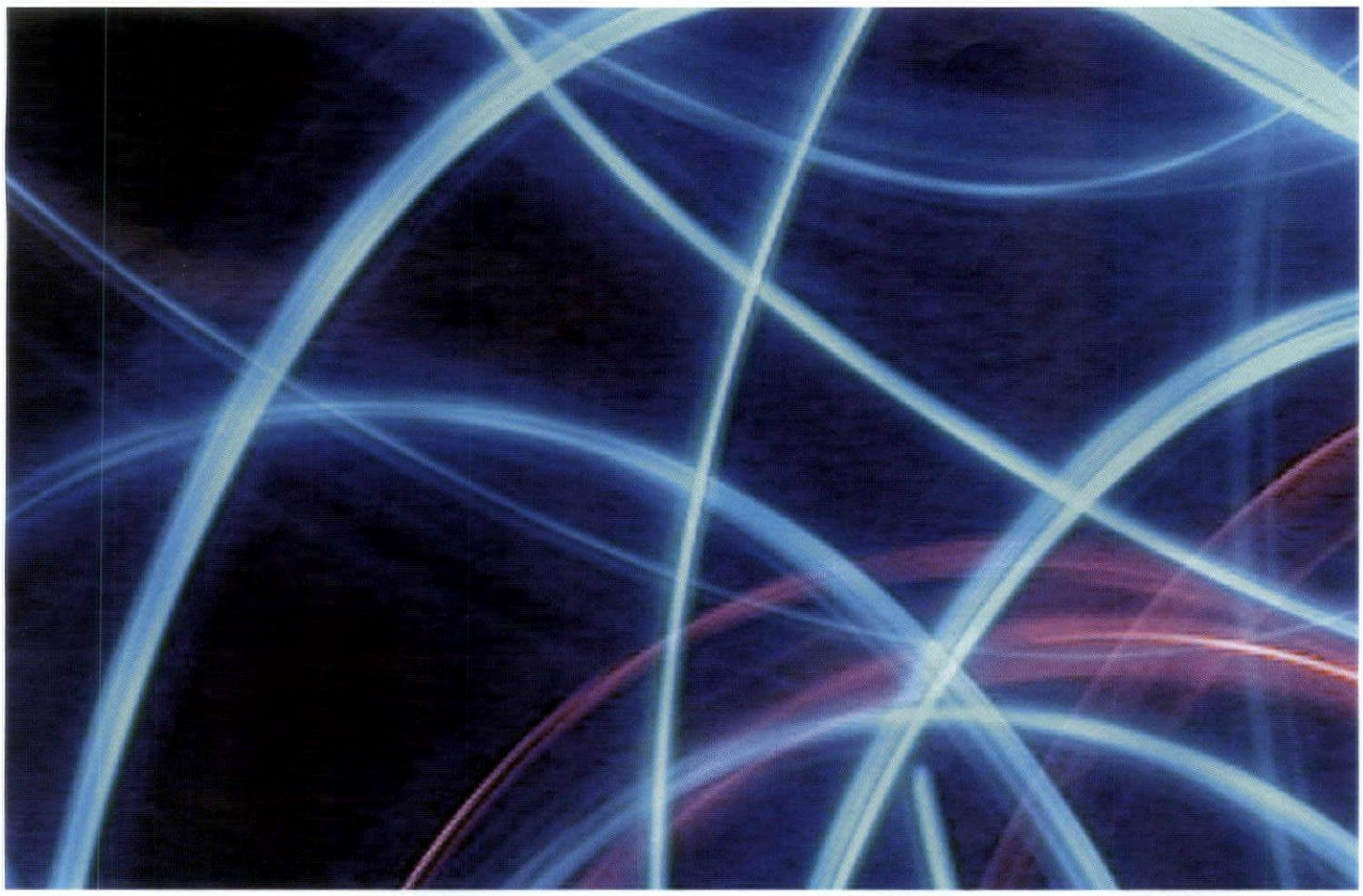
BLUE LIGHT VERSUS YELLOW LIGHT

Until recently, it was generally accepted that rods only work at night (scotopic vision), and that cones only work during the day (photopic vision). The current debate within lighting research centers on a new belief that rods (blue light) are active at higher light levels than previously thought. However, the measurement of light is based on a cone-only (yellow light) theory. Thus, a "yellow" light measurement would be lower than the "blue" light that our visual system senses. This would have obvious implications in the design of lighted spaces, where an accurate understanding of light levels is important in order to improve visual performance and/or save energy. The conclusion is that if blue light activates the rods, we should use blue-rich light sources in many interior lighting applications because our visual system perceives blue-biased light as brighter.

MORE COLORS, PLEASE

Given that so many other species possess color vision, are there other evolutionary applications of color, and how do they specifically relate to us? The answer to both of these questions lies in the evolution of our two additional cones—the green and the red. But first, a little background on the subject.

If we think of light striking the receptors in the retina, it is easy to see how we might discern brightness: a few strikes for low brightness and many strikes for high brightness. When it comes to color, however, strikes are not enough because, as it turns out, our cones are not actually color sensitive. They are wavelength sensitive. (Instead of colors, most current texts refer to the cones as S, M or L for short, medium or long wavelengths.) This is to say that cones are sensitive to a fairly broad wavelength band. It is the interpretation of the differential of the strikes to the cones by the brain that actually determines our sense of color. Thus, to see color efficiently requires two cones sensitive to different wavelength bands.



Our blue cone may have made us wavelength sensitive, but it was the addition of the green cone and later the red cone that enabled us to see color efficiently. And the evolutionary answer to the question, why bother with color vision, seems to be the symbiotic relationship between plants and animals; or, for us, the cherries among the leaves. If no organism can see a cherry among the leaves of the cherry tree, why would the cherry be red? The cherry doesn't need to be colored to eventually drop from the tree and make a new tree. However, to help the cherry seed travel farther away in order to better propagate itself, the tree requires some assistance. So, the cherry is red to distinguish the fruit from the green leaves and to attract red-color-sensitive organisms that might eat and carry the cherry some distance from the tree to spread the species.

The bottom line is that we are color sensitive because it was advantageous to both our food supply and us. Our color sensitivity encompasses essentially all of the colors found in our environment, and our environment provides the opportunity to utilize the full extent of our color vision.

COLOR ANARCHY

And now a note of caution. The consistent evolutionary reason for color vision has been a connection between color sense and the environment. Color had meaning. Initially, the blue color of the water meant foreground. Later, color enhanced the opportunity to discriminate vegetation. More recently, color provided the opportunity to detect food sources. In all cases, there was a specific significance to color.

But in today's world, is this the case? One writer has suggested that the colored beads a baby plays with may introduce color in a completely non-meaningful way. One bead is not "ripe" as compared to another; in fact, aside from the difference in color, the beads are identical. Color without specific meaning could be considered color anarchy!

From this perspective, consider color vision in relation to a typical merchandising environment. The new fall colors are sprinkled throughout the store. We name this season's blouses barn red, maze yellow and eggplant magenta. However, the name is as far as meaning goes. Having purchased the barn-red blouse, what sensible person will comment on how much the blouse reminds her of a barn? The fact that we go to such lengths to create meaningful names for colors, however, does imply that we are still desperate to provide meaning to colors.

Finally, if color is losing evolutionary meaning, could we eventually lose the ability to see color? It is an interesting question and one that has attracted the attention of several researchers. Since we share almost identical color vision with Old World monkeys, these researchers have compared the rate of color deficiency ("color blindness" is a misnomer) between the two groups. Findings show that Old World monkeys have almost no occurrence of color deficiency, while the rate is about 8 percent in human males and about .5 percent in females. Significant? Only time will tell. ■

Fred Oberkircher, IALD, IESNA, LC, is an associate professor at Texas Christian University (TCU) and director of the TCU Center for Lighting Education. A registered architect and interior designer in the state of Texas, he is also president of the West Texas Section of the IESNA and secretary of NCQLP, among many other distinctions.

Central Synagogue — story on page 22

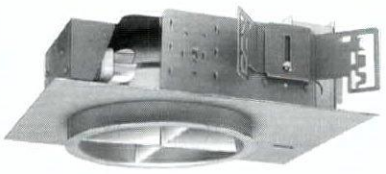
BK Lighting's Rainier series puts the power of a 75W MR16 lamp in a 120V supply fixture, and solves the problem of what to do with the low-voltage transformer, which is integral within the fixture. The Posilock knuckle ensures that the fixture stays aimed in a set position. The series is machined from solid aluminum and finished in a choice of eight polyester powder-coated finishes. **Circle No. 102**

Several **Edison Price** fixtures were used throughout the Central Synagogue facility in offices, hallways and function rooms. The Stacklite 150 OBM is a compact, efficient quartz wallwasher that provides uniform illumination on vertical surfaces, using a frosted T4 quartz lamp. The reflector pivots vertically within the fixture housing. The fixture can be mounted to a standard 4-inch octagonal outlet box. There is a track-mounted version as well. Brightness is controlled by interior specular black side-baffles. **Circle No. 103**

Lighting Services Inc (LSI) 239 series wallwash unit is designed to light vertical surfaces from top to bottom evenly. This is achieved by a unique combination of a 50-degree-by-50-degree molded spread lens and an aluminum kicker reflector. These can be easily removed when the unit needs to be changed to an adjustable PAR spotlight. Features include a locking front rotation, a self-locking adjustable full steel yoke for focusing on all planes, an on/off safety switch for relamping, focusing and maintenance and multiple accessory clips that will support a variety of LSI accessories. Units also accept the energy-conserving halogen and halogen infrared lamps up to 250W. The 280 series is a compact specification-grade unit specifically designed for PAR30 tungsten halogen and halogen infrared medium screw-base lamps. Its lightweight and miniature size makes it a perfect selection for short and medium applications. **Circle No. 104**

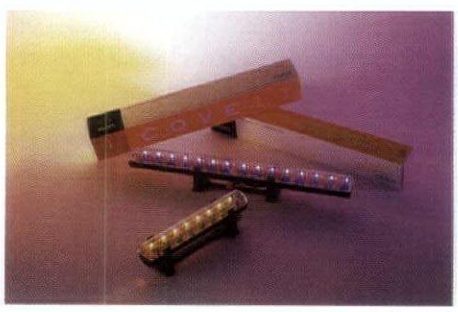
Edison Price's Anglux MR/4 is a 4-inch-aperture adjustable accent light for use with 12V MR16 lamps. The integral electronic transformer provides 11.8 volts to extend lamp life. The fixture includes a protective glass and has both easy tilt and rotation options. Once focused, the adjustment can be locked in place with two thumb screws. Recess depth is 6 3/4 inches. **Circle No. 106**

In the business of custom fixture fabrication since 1961 and a specialist in the refurbishment of historic luminaires, **Winona Lighting** was an obvious source for the Central Synagogue project. After fire ravished the building's interior, the design team created a new family of fixtures with a historic appearance, starting with the 48-globe chandeliers that march along the synagogue's central aisles. Winona fabricated these, as well as three variations of the pendant, sconces and wall-mounted fixtures—all inspired by the large chandelier design. Outside, decorative lanterns from Winona surround the synagogue. Symbolically, the fire spared the pendant that contained the menorah and Eternal Light; Winona restored and updated the pendant to comply with current electrical codes. **Circle No. 105**

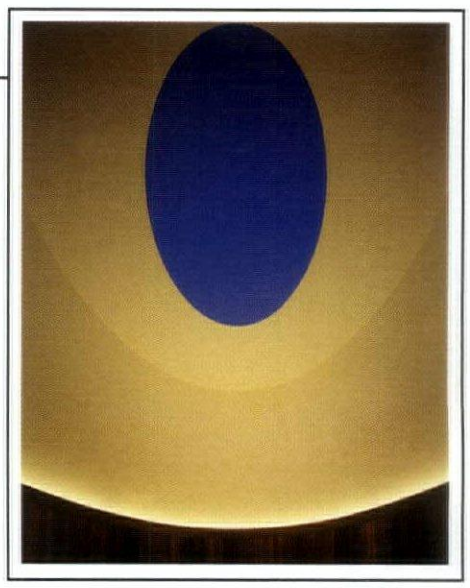


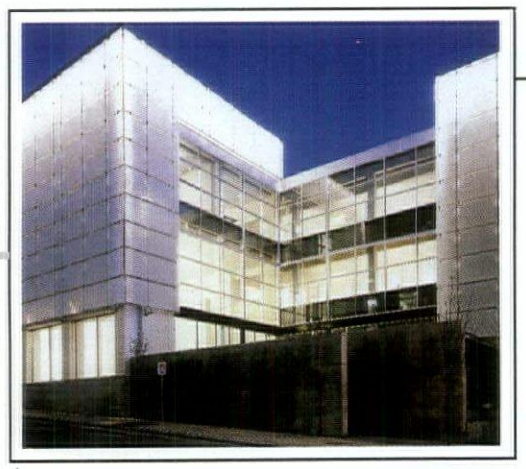
Edison Price's Super Baflux 226/8 is an 8-inch-aperture downlight used with two 26W compact fluorescent lamps. The unique parabolic reflector and cross-baffle assembly provide a precise optical control with very low aperture brightness. One housing allows for interchangeable use of downlight and wallwash reflectors. The recess depth is a slim 4 3/4 inches. **Circle No. 107**

Skyspace, *Light Reign* — story on page 26



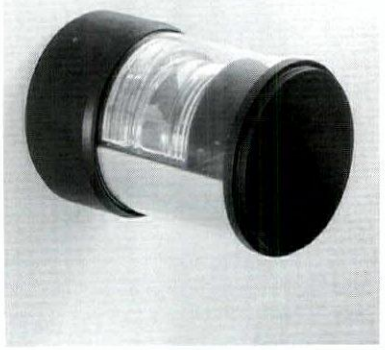
Color Kinetics' iColor Cove family of LED-based systems helps achieve the vibrant and ethereal colors of James Turrell's Skyspace installation at the Henry Art Gallery in Seattle. iColor Cove LT allows dynamic color and lighting effects to be used in tight spaces, such as alcoves. This product projects a soft-edge strip of light at a 100-degree beam angle. Each unit is slightly over an inch thick and available in either 6- or 12-inch lengths; it also allows for individual control via the on-board microprocessor or by an external Color Kinetics or third-party controller. Each unit may be attached end-to-end or in a staggered arrangement, creating unlimited possibilities for curves and other complicated configurations. **Circle No. 108**

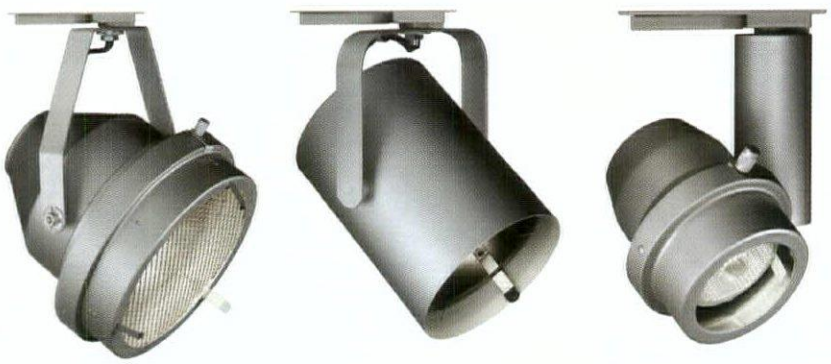




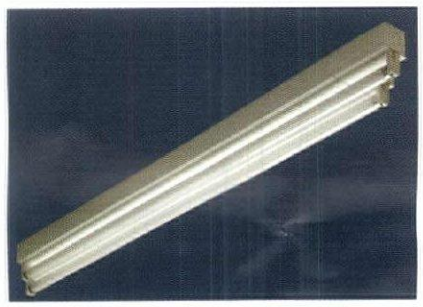
Racine Art Museum — story on page 28

Architect Brad Lynch and his team tested almost 20 different luminaires for the exterior lighting of the Racine Art Museum, before settling on the Vertical Surface Illuminator (VSI) from **Bega**. The fixture's unique optical system features a half-cylinder Fresnel lens and dual specular reflector, the combination of which eliminates the usual conical beam spread to illuminate large vertical areas uniformly up to a distance of 30 feet. A machine-cast aluminum structure and stainless-steel hardware, thick acrylic lens and temperature-resistant silicone gasketing are rugged enough for even Wisconsin weather. **Circle No. 109**

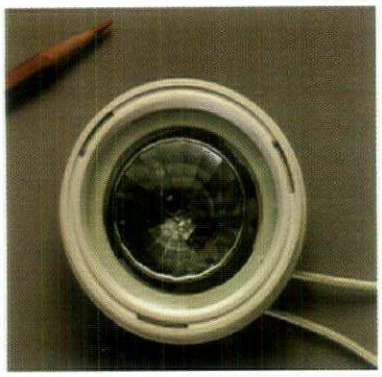




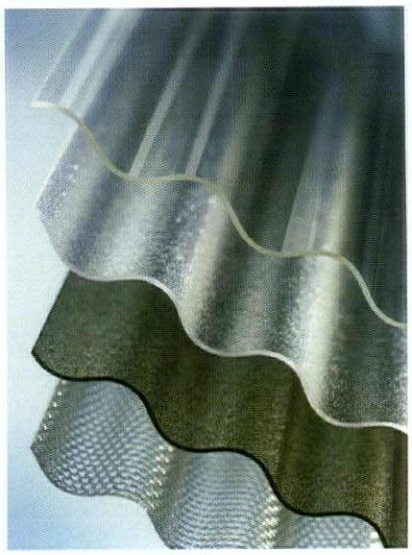
Lighting Services Inc supplied the track system that illuminates the artwork housed in the museum. Fixtures include the C110 (center) and C150 series cylinders, which are fully adjustable and can function as accent or general lighting depending on the wattage and beam spread. The C110 is appropriate for medium-throw applications; the C150 for medium- to long-throw applications. The LN20 (right) and LN16 series have a clean profile with a hinged front for easy relamping. The LN20 accommodates tungsten halogen PAR16 and PAR20 lamps, while the LN16 works with tungsten halogen MR16s. Lastly, the 500 series spotlights (left) provides a long-throw distance and high-intensity accent lighting. It features a heavy-gauge steel and aluminum construction with a universal swiveling and a rotating lamp holder. **Circle No. 110**



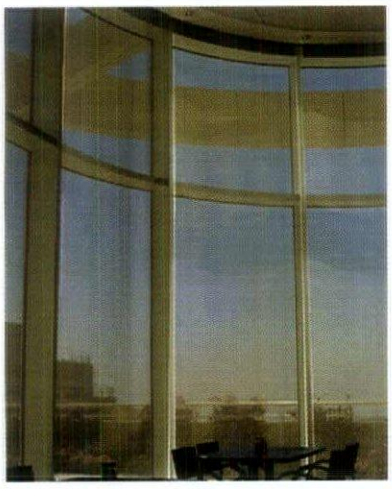
The museum's large circulation zones are illuminated with 17W T8 fluorescents tucked in soffits to provide general ambient light without polluting the design with lighting equipment. **H.E. Williams** provided the staggered fluorescent strips; their 3-inch housing offset provides uniform illumination in continuous row installations. The product can be surface-mounted or suspended and is UL-listed for dry and damp locations. All parts are painted after fabrication to inhibit rusting; factory-mounted, pre-wire sockets cut installation time. **Circle No. 111**



The Puklight from **Lucifer** is a low-voltage palm-sized lighting fixture available in both lensed and unlensed versions. Both can be recessed or surface mounted. A 12V 10W maximum bi-pin xenon lamp is standard. Finishes include matte white, matte black, satin chrome or satin brass. **Circle No. 112**



An acrylic panel from **Deglas** interacts with the exterior lighting to give the museum its unique nighttime glow. Typically used for greenhouses, the lightweight, durable paneling system proved a cost-effective alternative to removing the limestone façade that encased the building. The product is shatter resistant, easy to install and available in a variety of shades and surface textures. **Circle No. 113**

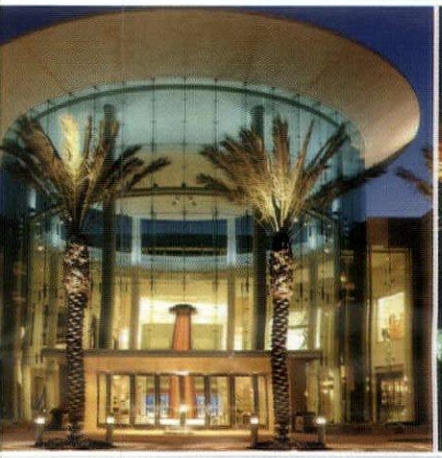


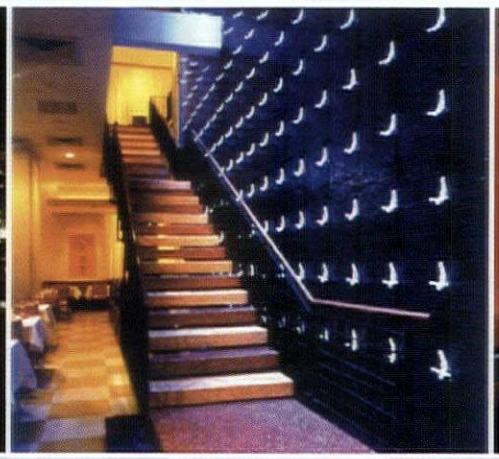
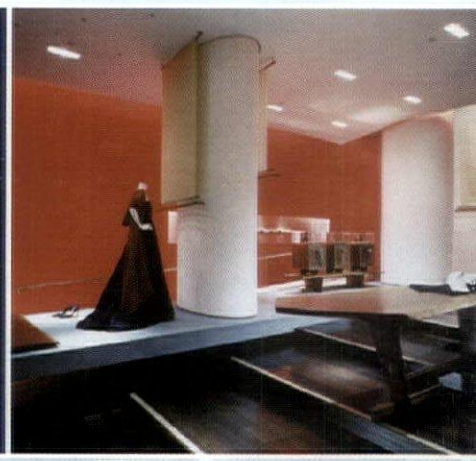
Visibility into the museum from the street was a critical component of the design, as was the incorporation of daylighting; however, the designers also had to control ultraviolet light and temperature to protect the artwork. The three-story window wall that surrounds an exterior courtyard on the museum's south side incorporates a screen from **MechoShade Systems** to control direct sunlight. The product (shown here in the Getty Museum in California) is available in EuroVeil or ThermoVeil shade cloths as a manual, motorized, automated or computerized system for windows, skylights and atriums. **Circle No. 114**

"Light is the most powerful tool of architects and interior designers."

Architectural Lighting Master Classes

March 11-12, 2004



when and where

March 11-12, 2004
John Jay College
899 10th Avenue
at 58th Street
New York City

speakers include renowned lighting experts

Howard Brandston
KEYNOTE SPEAKER
Paul Gregory
Jonathan Speirs
Fred Oberkircher
Ann Kale
Willard L. Warren
Ray Grenald
Robert Prouse

who should attend

Architects
Interior Designers
Lighting Designers
Electrical Engineers
Team Leaders
Project Managers
Owners
Students
Educators

Be inspired. Foster ideas. Gain a competitive edge.

The Architectural Lighting Master Classes educate, inform and inspire today's design community on how to enhance projects using creative lighting design. Developed by an international, award-winning team of lighting experts, this intensive two-day seminar engages you in the creative process of using lighting to define the character and emotional experience of your space.

ALMC offers 10 intensive seminars to train architects and designers and includes a Manufacturers Showcase with the newest lighting products.

Produced by **Sonny Sonnenfeld**, ***Architectural Lighting*** and ***Architecture***

Creative Consultants **Paul Gregory** and **Jonathan Speirs**

Co-sponsored by the American Institute of Architects, New York Chapter

CONTINUING EDUCATION AIA

Earn 16 AIA* credits as well as 12.5 NCQLP credits

registration cost

$550 Early Bird (before 01/01/04)
$595 Regular Registration

***AIA member special rate**

$500 Early Bird
$545 Regular Registration

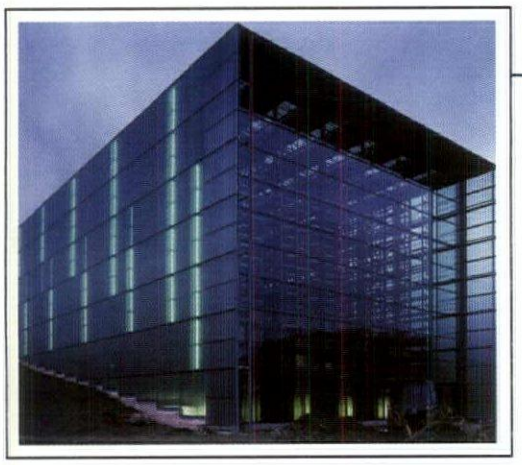
Presented by: ARCHITECTURAL LIGHTING ALMC MASTER CLASSES

architectural lighting

ARCHITECTURE

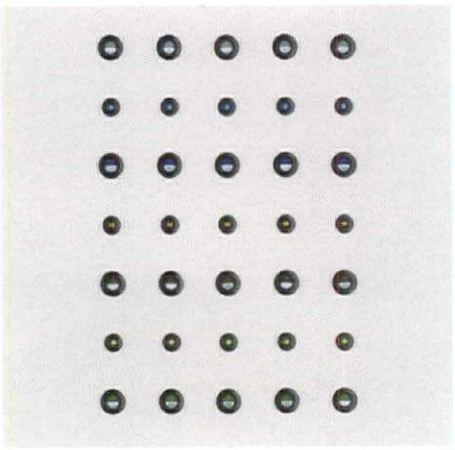
Circle No. 94 on reader service card

For a list of session topics or to register, go to www.lightforum.com/masterclasses
or contact Christina Mendez at 800.950.1314 x 4581, 646.654.4597 fax, cmendez@vnubuspubs.com
770 Broadway, New York, NY, 10003



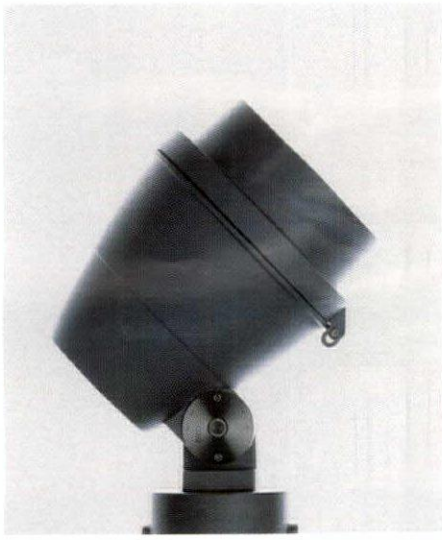
Erco P3 Warehouse — story on page 32

Erco saw its automated P3 warehouse as an opportunity to showcase its own lighting products. The intricate lighting display that plays on the exterior skin is controlled with Erco's Area Net system for light management and scenic dimming. Components have their own microprocessor with integrated LON interface, enabling individual addresses to communicate with each other more fluidly. Daylight sensors are also incorporated to maintain consistent light levels in a space, or in the case of Erco's P3 warehouse, to turn on the lighting display on the façade at night. **Circle No. 115**



Lighting designer Uwe Belzner used LEDs to narrate the movements of the six automatic stacking cranes that store and retrieve pallets. A 16-inch-square panel of orange LEDs is mounted atop the machines and can be seen through the glazed façade zipping up and down the aisles.

LED orientation luminaires from Erco were used as signal lighting for the truck bays. Available in two sizes and four colors (white, blue, amber and green), Erco's luminaires are fitted with stainless-steel and scratch-resistant-glass covers in a plastic housing. Both sizes are available in single- or two-color versions. Networked together with a control system, the LEDs can change color, dim and flash for interesting applications. The face of the LED fixture is available as a circular aperture, as a ring-shaped light aperture or as a floor washlight. **Circle No. 116**



With its cast-aluminum housing and internally routed wiring, the Beamer projector from Erco is suitable for both indoor and outdoor use. Erco employed it to highlight the company's logo on the building exterior façade. Segmented reflectors produce even lighting with a soft edge over great distances; a pivot bracket enables precise tilt angle and a snoot with integrated cross baffle and safety glass allows a cut-off angle of up to 50 degrees and control of spill light. Various accessories and mounting options are available. **Circle No. 117**

Erco's Lightcast recessed downlight can be specified for wet locations, inside or out, and its Darklight reflector technology is protected from infiltration of dirt. The downlight has a cut-off angle of 30 degrees, and patented diffuser technology further helps avoid uncomfortable glare. This product lights the bridge that extends from the southwest side of the P3 warehouse to an older factory. **Circle No. 118**

ERCO PRODUCTS CONTINUED ON PAGE 52

Precision

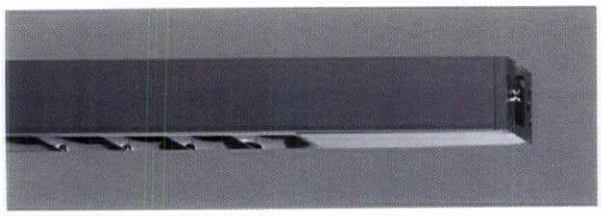
Juno's new Gyrus™ luminaire delivers precision with its aerodynamic styling and superior performance. Its integral accessory holder and front relamping makes it easy to maintain. It can be used with any of Juno's trac systems—Trac-Master,® Trac 12® and Flex 12™—for a wide variety of residential and commercial applications.

Gyrus is just one of many new trac designs and innovations now available from Juno. To receive a complimentary copy of Juno's new Trac-Master® catalog visit **www.junolighting.com/catalog** or call 1-800-323-5068.

Circle No. 90 on reader service card

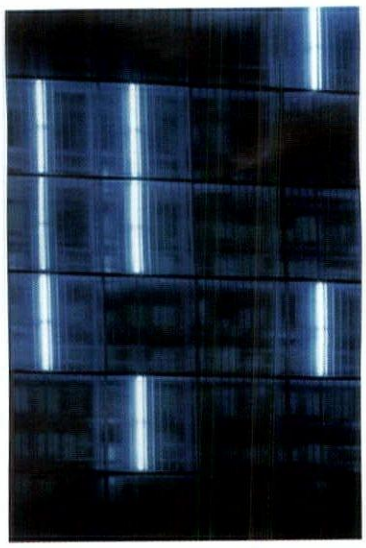
JUNO®

Erco — continued from page 50



Providing general lighting for the indoor workspaces on the southwest side of the building, Erco's T16 features a small profile for use with T5 fluorescent lamps. The fixture is available in three types: direct luminaires, direct/indirect luminaires and indirect luminaries. Powder coated in white or silver, the T16 has mounting plates for attaching another fixture or for connectors. The profile is especially suitable for forming a linear, right-angled layout. A hinged connector enables other geometric forms, and the luminaires can be suspended with tubes or wire ropes. All direct fixtures are fitted with low-brightness reflectors with 40 - egree cut-off angles. **Circle No. 119**

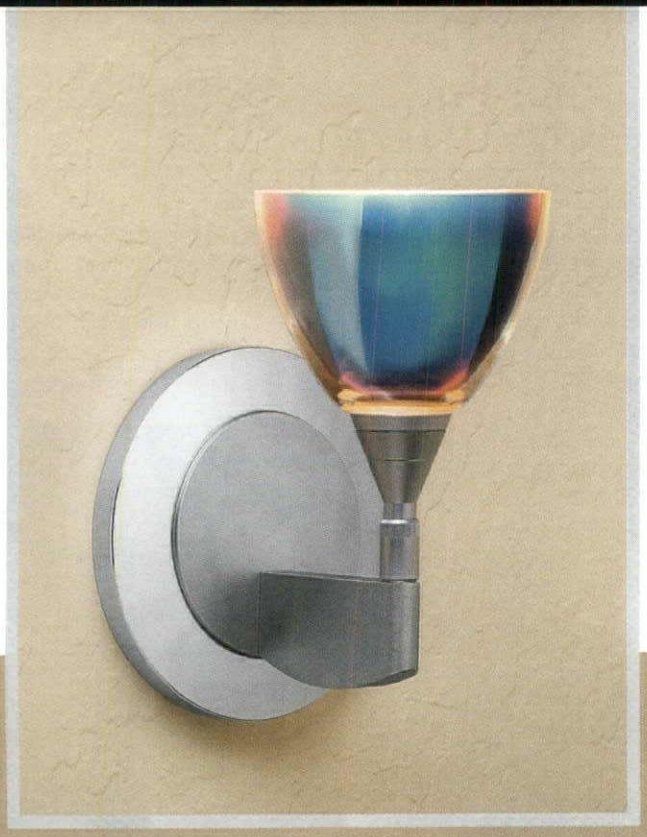
The Tesis line of recessed floor luminaires includes adjustable uplights, lens wallwashers and directional fixtures. The product is dust-proof and suitable for even permanently damp locations: Erco used it for landscape lighting outside the P3 warehouse. Corrosion-resistant cast-aluminum housings with sturdy safety glass further insure the product's durability. Tesis also features the Darklight reflector technology. **Circle No. 120**



Osram Sylvania provided the fluorescent lamps that create the barcode simulation on the warehouse's façade. A total of 280 Lumilux cool-white L58/21-840 fluorescent lamps are fitted with Erco's "Special Steel Blue" color-filter sleeves. The lights are dimmed from 100 percent to 1 percent using dimmable Quicktronic DIM ECG units from Osram. These, in turn, are managed by a control system from Erco. **Circle No. 121**

BRUCK

LIGHTING SYSTEMS



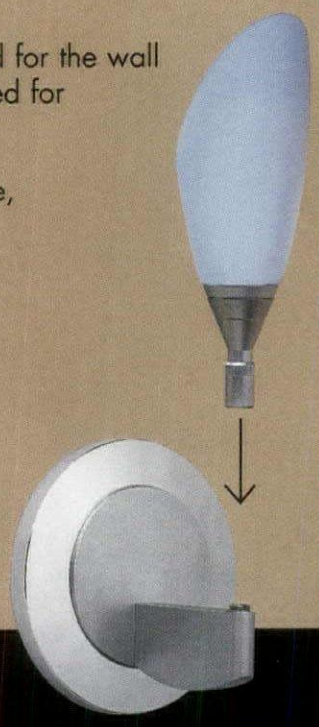
Simply Plug In

Merely plug the Bruck Uni-Light into the wall bracket.

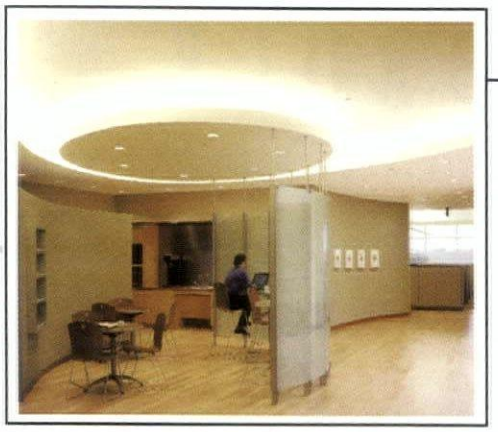
The same Uni-Light used for the wall bracket can also be used for any Bruck track system.

Low-voltage wall sconce, integral transformer included.

Offered in chrome, matte chrome, or combination.



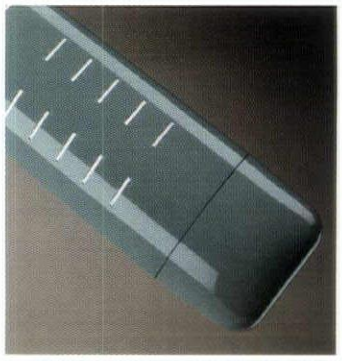
714 424-0500 Fax 714 424-0505 Costa Mesa, CA **www.brucklighting.com**



Corporate Campus — story on page 34

Although **Bega's** pole-mounted luminaries are traditionally used for exterior applications, this corporate headquarters building in Texas employed the fixture to add accent in the dining area. The heavy one-piece die-cast aluminum housing with an integral transition fitter accommodates a 3-inch-diameter pole top and is secured by six flush, stainless-steel set screws. The housing accepts two 3/4-inch-diameter struts located at 180 degrees, as well as a die-cast aluminum diffuser retaining ring. The louver stack lamp shield is enclosed in a clear acrylic cylinder and reflective white top cone with a high-temperature-rated silicone gasket. The reflective disk, available in two diameter sizes, is a 1/4-inch-thick aluminum plate secured by two die-cast aluminum fixed clamping saddles. **Circle No. 122**

The ceiling cove in the break area is illuminated with **Belfer's** 2850 compact fluorescent series. It combines high efficiency, color corrected 18W, 39W, 40W and 50W lamps with a patented seamless curvable system. It is available in multiple lamp lengths for cost-effective installations. This series employs rapid-start, high-power factor, and dimming (39W, 40W and 50W only) or electronic ballasts within its slim anodized aluminum profile. Straight and curved lengths can be combined to create continuous wall-to-wall lighting. The 18W requires 12-inch on-center spacing; the 39W uses 18-inch on-center spacing; and the 40W and 50W employ on-center spacing of 24 inches. Lift up sockets allow easy relamping. Voltage options are 120V or 277V. **Circle No. 123**



In order to create a comfortable and glare-free working environment in the computer-rich open-office areas, the **Peerless** Diminutive series was used. This soft-light indirect system uses T5 high-output technology to create a high-performance fixture in a relatively small housing. This allows for the most balanced distribution of light with the fewest number of fixtures. The product line is available in two styles: Lightduct, a curved fixture, or Lightfin, an angular design. Either style is a slim 6 inches by 2 inches, and can be ordered in 4-, 8- and 12-foot modules or in custom lengths up to 24 feet. The thin profile makes the fixture uniquely appropriate for low-ceiling conditions. The pendant-mounted fixtures can be specified in two ways—as totally indirect or with slot-patterned bottoms to allow brightness below. **Circle No. 125**

The overwhelming size of the dining area and significant amount of natural light illuminating the space during the day presented an extreme lighting challenge. Bos Lighting Design's modification of **Elliptipar**'s single reflector and lamp cove light (Style 305) into a double-headed dual T5 fixture was so successful that Elliptipar has made it part of its standard product line (Style 308). The larger upper reflector maximizes asymmetric performance and can be aimed for longer throws of light. The bulbs are independently adjustable; yet share a common ballast to allow for through wiring and easy installation. **Circle No. 126**

In order to achieve the right color balance on the limestone walls adjacent to the connecting stairs, **Hydrel** 9100 series in-grade HID flush-mounted uplights were used. These multipurpose modular units are designed to be flush mounted in planting areas or concrete. The lamp and power modules are factory sealed, thermally protected, and connected by submersible rated connectors. The fixture comes in either round or square body styles. The HID 175W luminaires are 12 inches in diameter and 18 inches deep, and the incandescent 250W luminaires are 12 inches in diameter and 11 inches deep. **Circle No. 124**

adindex

ADVERTISER	PAGE	CIRCLE NO.
Alanod-GmbH & Co. KG	1	2
Altman Stage Lighting	37	92
Architectural Area Lighting	10	34
Architectural Lighting Master Classes	49	94
B-K Lighting	17	7
Bartco Lighting	16	49
Bruck Lighting	53	15
C.W. Cole	55	50
Con-Tech Lighting	52	73
CSL-Creative Systems Lighting	46	66
Delray Lighting	21	40
Electrix	12	18
Elliptipar	Cov. 3	6
Engineered Lighting Products	42	42
Erco Lighting	Cov. 4	31
FAD Lighting	2-3	95
Juno Lighting	51	90
Kim Lighting	15	12
Lighting Services Inc.	13	39
Leucos USA Inc.	8	11
Leviton Mfg. Co.	7	46
Lighting Controls Association	9	
Luraline Products Co.	50	60
Lutron Electronics	41	9
Martin Professional	43	54
Metalumen Mfg. Inc.	14	91
NoUVIR Research	18	24
Osram Sylvania	Cov. 2	38
Prisma Architectural Lighting	5	5
Selux Corp.	6	85
Sentry Electric Corp.	44	56
Tech Lighting	20	8
Tridonic	56	25
Valmont Industries	54	13
W.A.C. Lighting	19	72
The Watt Stopper	38	27

Publisher is not liable for errors or omissions.