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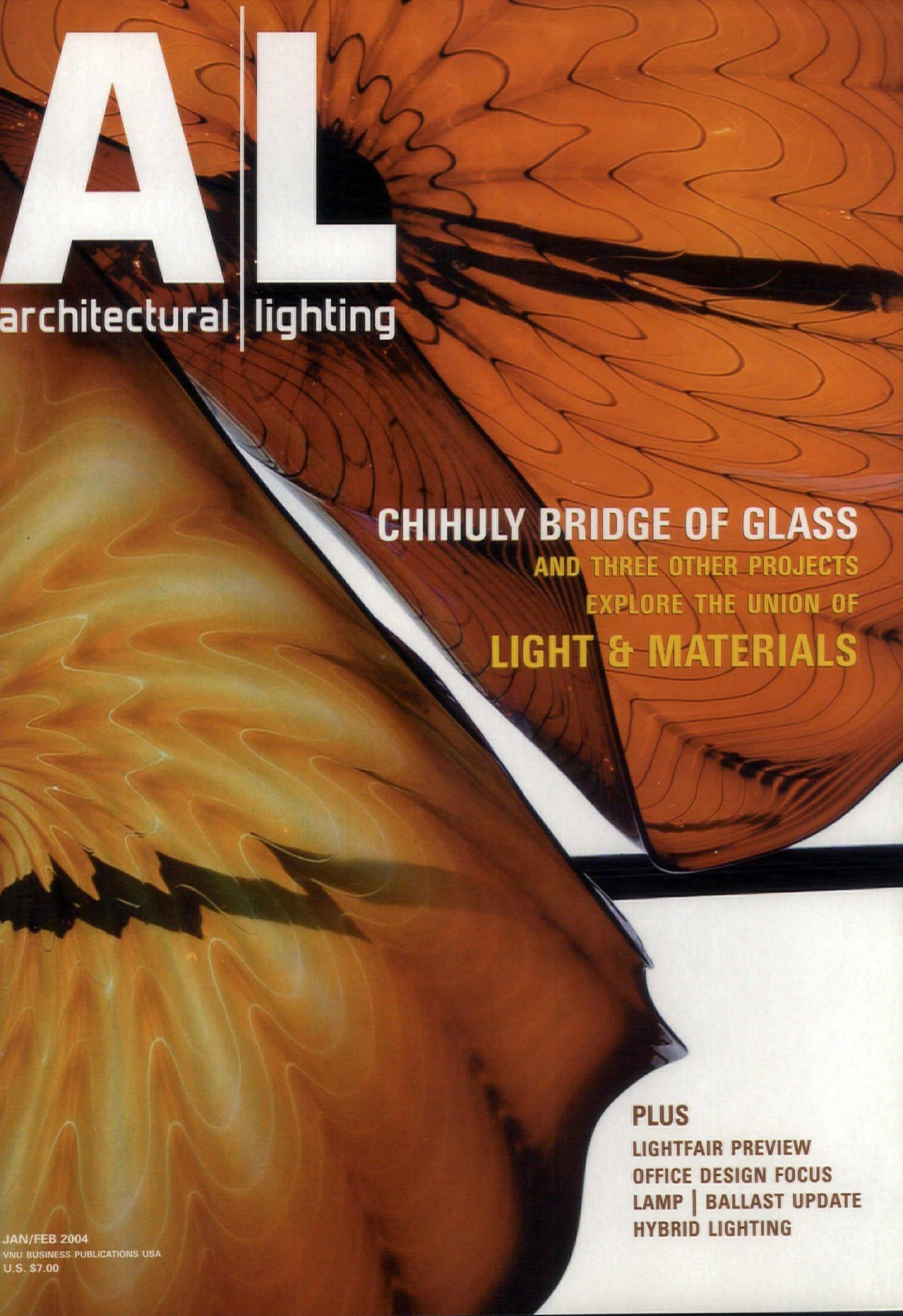

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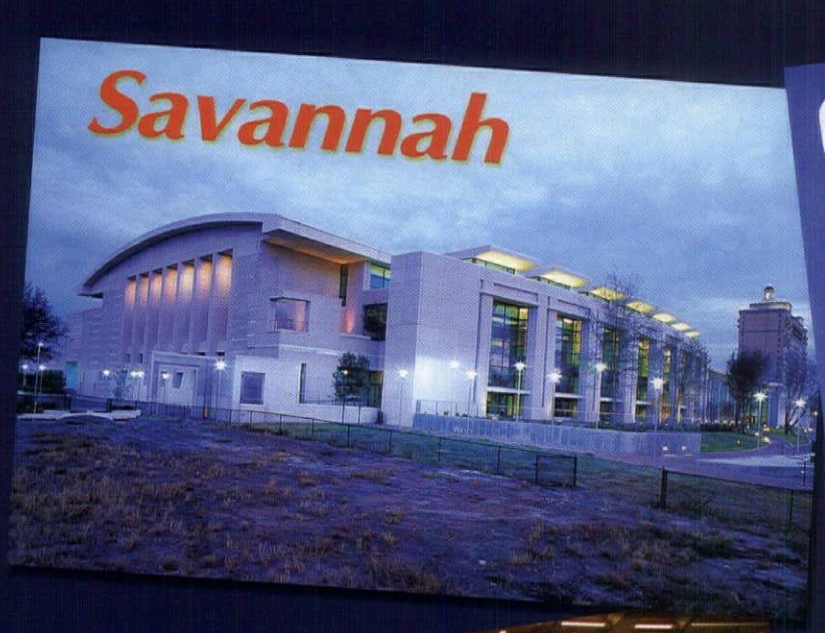
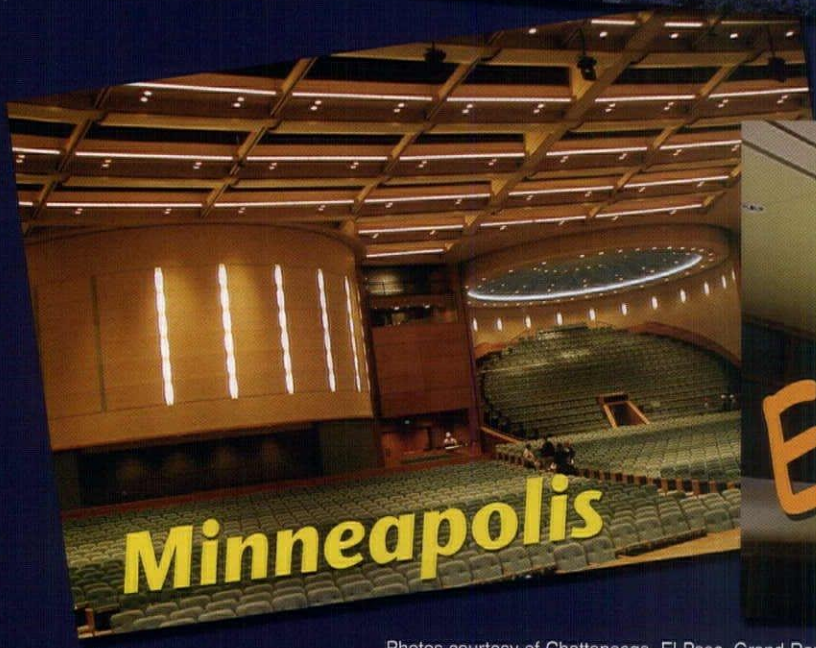
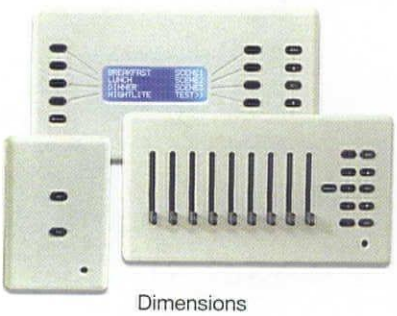




Photos courtesy of Chattanooga, El Paso, Grand Rapids, Minneapolis, Natchez, Overland Park, Pittsburgh, Portland, Reno-Sparks, and Savannah Convention Centers.

Leviton's Dimensions D-8000. Truly conventional wisdom.



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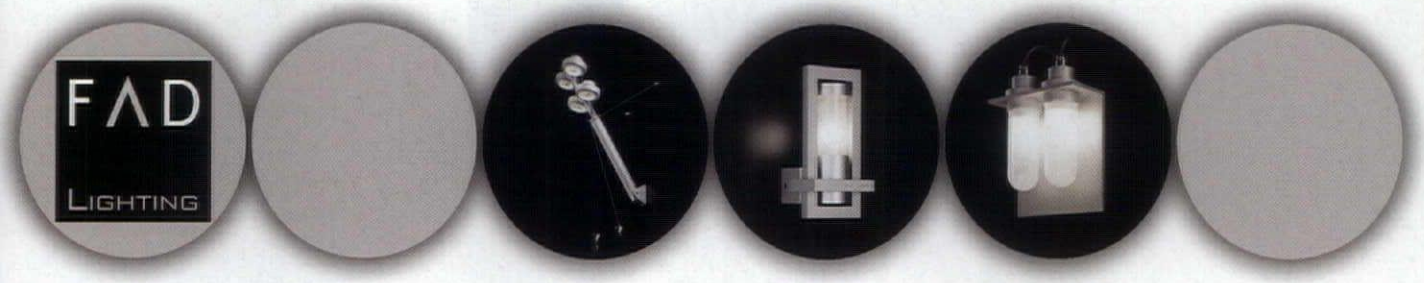

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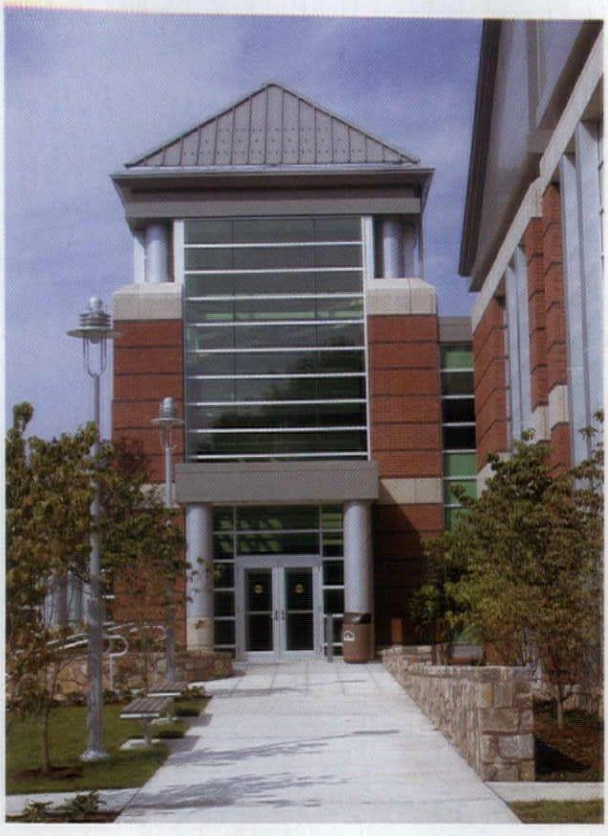

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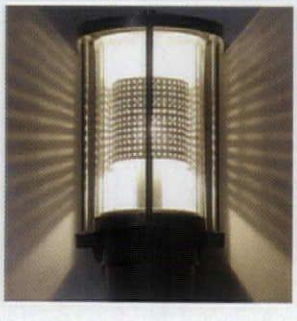

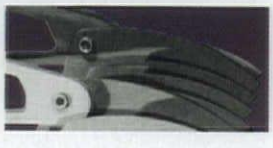

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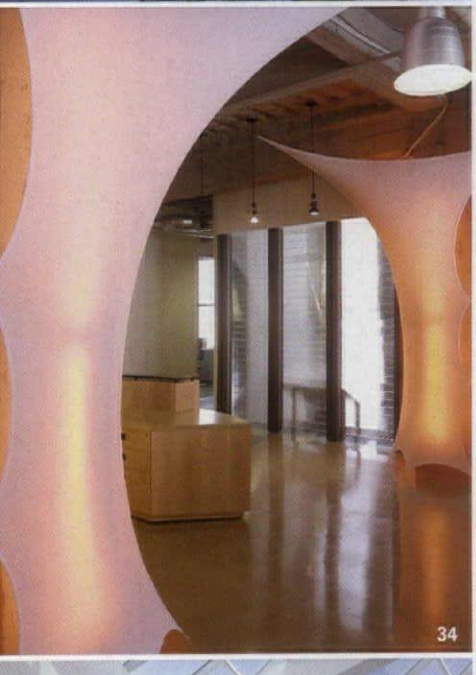

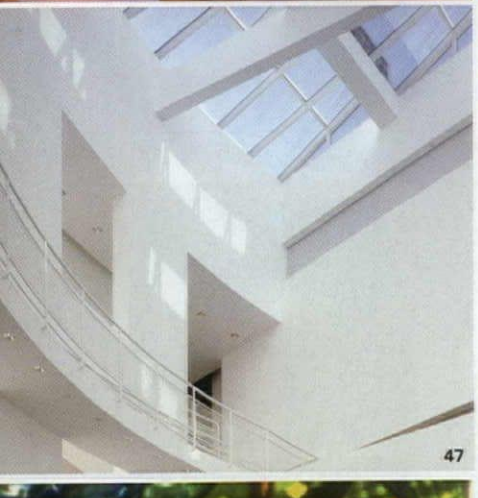

industry

projects

details

Cover: A detail from Dale Chihuly's *Monarch Window*, 1994, Union Station, Tacoma, Washington. The artist's train station installations marked the beginning of large-scale work for Chihuly, fully realized in the neighboring Bridge of Glass (page 28). PHOTO: ELIZABETH DONOFF

A sustainable design article

Additional information at www.archlighting.com

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An Industry—and a Magazine—Evolving

I JUST RETURNED FROM THE IALD ANNUAL MEETING and Education Conference in Vancouver. It was an edifying experience. Observing the event, I gradually understood the significance of the crowd: These are the captains and pioneers, the creative individualists that built the concept of lighting design into the architectural panorama. The first and second generation of a young industry, their awareness of its condition is acute and their observations are extremely relevant. Listening to the discussions, I heard the reiteration of a pressing question: How do we grow and sustain a demand for quality lighting?

This was not the first murmur of anxiety for the profession's future: Last October, the Lighting Research Institute sponsored "*Bridges in Light*," reviewed in this issue by Jim Benya. The event pointed to the looming "commoditization" of the lighting industry, a process that often erodes profits, discourages innovation, and smothers research and development efforts. Indeed, manufacturing seems to be packing its bags for Asia, where commodity products are less expensive to produce and intellectual property laws are easy to ignore. This dime-a-dozen attitude could threaten the livelihood of designers and manufacturers alike.

As a responsible editor and observer, I am obliged to remind readers of Henny Penny, whose friends follow her on a pilgrimage to tell the king the sky is falling, and instead are led to the fox's cave. The message: Beware of the prophets of doom. There are those that would argue the industry is just fine; and, indeed, we have featured a few in a new column called "Exchange" on page 72. The sky may not be falling, but I think most will agree the climate is changing. It is, at the very least, a period of reinvention. What is the next wild frontier for lighting design? How will the profession ensure its relevance and longevity? The industry as a unified community must consider these questions seriously.

Architectural Lighting understands how grueling—and exciting—reinvention can be; we recently asked ourselves similar questions: Who are the magazine's readers and what are their professional needs today? What will they need tomorrow? How do we make this information comprehensive and palatable? A survey, a focus group, and many, many long hours later, we think we have answers. They are packaged in the redesigned *Architectural Lighting* you hold in hand.

AESTHETIC A|L speaks to designers: We have renovated its visual presence to reflect this, with a simplified, contemporary logo; bright layouts; and cohesive color and line elements.

ORGANIZATION A|L's readership requires easily navigable information. We have organized the magazine's content into three sections that reflect the layers of the lighting design profession and the elements inherent in the design process: the industry in general, its projects in specific, and technology and products in detail.

ICONS A|L serves a community highly aware of sustainability issues: A new icon on the table of contents directs readers to relevant articles in each issue. A second icon indicates stories with expanded coverage on the (also redesigned) A|L website. Here, we will enhance our monthly print stories with additional images and renderings, product information, sidebars and animations. The website will also offer regularly updated news briefs, company buzz, events and competitions, and new product highlights.

CONTENT A|L's readers are a special blend of design professionals: lighting designers who know a lot about the industry and the intricacies of achieving quality lighting, and architects who wish to. Our content additions seek to balance these levels of consciousness.

The new "Highlights" column briefly reviews an iconic project airing prime time in the architectural press, to illustrate that the lighting design of these buildings is as critical to their acclaim as the "starchitect" behind them. In other words, quality lighting design is an essential component of notable architecture.

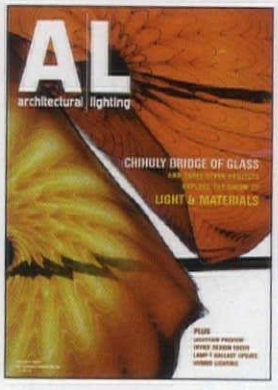
The "Methods" section explains the process behind a challenging design scenario. Additional drawings and renderings, and product information throughout also speak to the process of lighting design in a way that respects the varying approaches and proficiencies of our readers.

Finally, "Exchange" embodies an important aspect of our personality as a magazine. We are a friend to all industry associations, but officially allied with none; therefore, we hope to be a forum for open, honest discussion about the difficult issues, those affecting all walks of the community—lighting and interior designers, architects, manufacturers, researchers, facilities managers and users. "Exchange" will ask those thought-provoking questions, publishing several responses in print and many more on the website.

These changes will enable us to better engage our diverse circulation—which is unmatched by any magazine dedicated to architectural lighting in North America. With this advantage, A|L is uniquely positioned to help its industry investigate and respond to that vital question: How do we grow and sustain a demand for quality lighting?

We are prepared for the challenge. Are you?

EMILIE W. SOMMERHOFF
EDITOR-IN-CHIEF



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PARSONS SCHOOL OF DESIGN CREATES MASTERS OF LIGHT

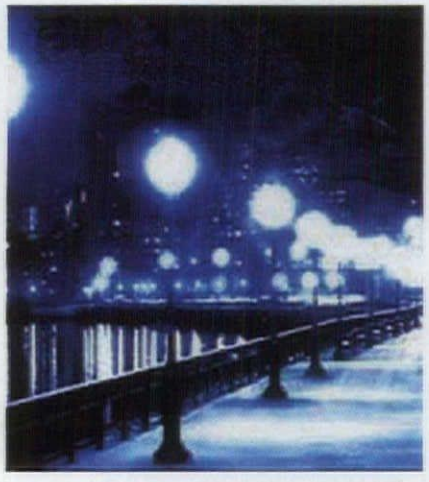
Parsons School of Design has announced it will replace its current one-year Master of Arts lighting degree with a two-year Masters of Fine Arts program. Starting in September 2004, the curriculum will expand its offerings in the areas of light perception, history theory, sociology, daylighting and sustainability, while continuing its strong core of technical coursework. The new curriculum will allow lighting students to work directly with graduate students in architecture and interior design, as the school promotes a cross-disciplinary "dialogue" between design professionals.

"Lighting design is a very underappreciated discipline, given its significance in the built environment. There is a perception that it's a technical service rather than a discipline with a deep history—one that has been aesthetically and psychologically critical in the shaping of social life. We're hoping to change all that," says Peter Wheelwright, chair of the Architecture, Interior Design, and Lighting Department.

Since its inception in 1984, the lighting program at Parsons has moved to the forefront in lighting education. The graduate degree program was the first in the field of architectural lighting, and is the only program focused primarily on design and social practice. The work of Parsons Lighting students is regularly recognized in lighting design competitions and merit scholarships. Program director JoAnne Lindsley, the immediate past president of the IALD, and principal of Lindsley Consultants, will continue to direct the 30-member faculty. For more information, visit www.parsons.edu/architecture. **ELIZABETH DONOFF**

CITY LIGHTS DESIGN COMPETITION

The New York City Department of Design and Construction, in conjunction with the Department of Transportation, has announced a two-stage international design competition for a New York City streetlight. The current city standard is over 50 years old. The competition is open to the entire design community, and multi-disciplinary teams are encouraged to participate. The design challenge is to create an innovative, state-of-the-art design that responds to the unique diversity of the city's architecture and urban landscape, while meeting the technical performance standards for a New York City streetlight. Competitors should submit concept ideas in Stage I; three finalists will be selected to progress to Stage II and will receive an honorarium to develop more detailed designs. Stage II competitors must include at least one licensed structural engineer on their team. The winning design and its variations will light streets, sidewalks and parks within the city's five boroughs. Jurors include architects Elizabeth Diller and Peter Eisenman, lighting designer Paul Marantz and structural designer Guy Nordenson. The entry fee is $100; the registration deadline is March 12, 2004; and the Stage I submission deadline is May 14, 2004. For more information, visit the competition website at www.nyc.gov/buildnyc/citylights. **ED**



Visit www.archlighting.com for timely news updates, company buzz, events and competition information.

159 NEW LC TITLES ARE IN

The results are in. Of the 203 individuals who sat for the National Council on Qualifications for the Lighting Professions (NCQLP) exam last November, 159 passed; 147 became full Lighting Certified (LC) and 12, as part of the NCQLP Intern Program, became new Intern LCs. That is a 78 percent pass rate. There are now a total of 1,110 lighting professionals worldwide, including lighting designers, electrical engineers, manufacturers, and sales representatives able to use the LC designation after their name. "The goal of the LC designation is to standardize the baseline for the industry," explains Mary Jane Kolar, NCQLP executive director. In the sevem years since the exam was instituted, the number of people taking the exam has increased only slightly. The NCQLP board is considering the possibility of switching over to a computerized format that would allow the test to be offered more frequently. The earliest those changes would go into effect is 2005. For now, the 2004 paper test date is set for November 6. **ED**

A HOUSE FULL OF LEDS

It wasn't cheap, but an apartment in London proves it can be done. As reported recently in the *New York Times* ("Let There Be LEDs," January 8, 2004), interior and commercial designer Marcel Jean Vos has created a one-bedroom living space lighted entirely by LEDs—to the tune of $50,000. The 360 LED arrays, and the 20 yards of plastic ribbons embedded with the light source and installed around the apartment, use electricity equivalent to four 100W incandescent bulbs, says the article, which illustrates why the technology is so hot. Admittedly there is R&D work to be done in this area before such a scheme becomes actual practice; but no matter how unreasonable it still is for the population at large, this feat is the beginning of something big. What should really make LED manufacturers (and the whole industry) sing, however, is the mainstream media attention this technology is getting. The public is tuning into lighting. **EMILIE W. SOMMERHOFF**

Visit www.archlighting.com for timely news updates, company buzz, events and competition information.

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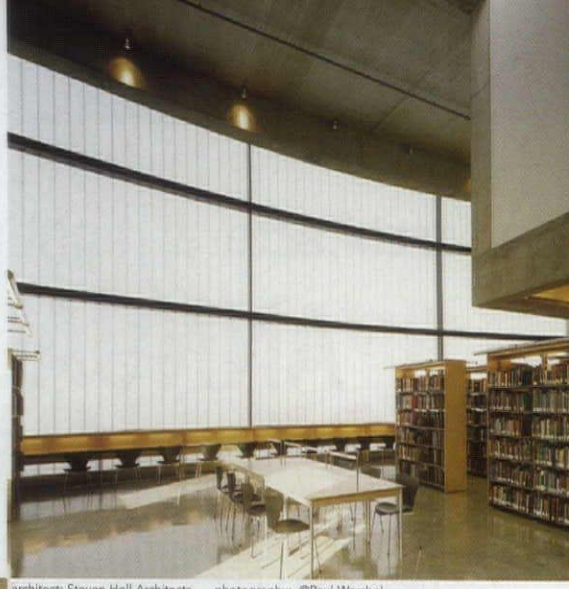

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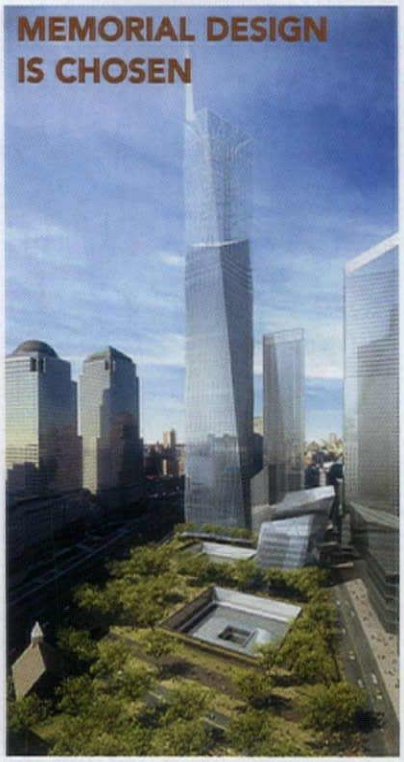

From 5,201 entries, to 8, to 1: that is the numbers game that has played itself out in the selection process of the World Trade Center memorial. (See November/December 2003, page 9.) The 13-member jury has chosen Michael Arad's design, *Reflecting Absence*, from the group of eight semi-finalists. Mr. Arad's revised scheme seems to have been dressed up with landscaping by Peter Walker (a new team member), and the addition of an interpretative center and inclusion of preserved artifacts. Unlike many of the other semifinalist selections that included a lighting element as part of the place-making tools, it is difficult to discern how lighting elements will be incorporated in *Reflecting Absence*, other than the use of daylight in a few of the below-grade spaces. The task is a daunting one, no matter who the designer is, and hopefully a respectful incorporation of lighting elements will contribute to the design as the scheme evolves intoits final form. **ED**

IALD SEMINARS NOW ACCREDITED WITH RIBA

The Association of Lighting Designers' UK Region is now a member of the Royal Institute of British Architects (RIBA) Continuing Professional Development (CPD) providers network. Three seminars have been approved for accreditation through the CPD program: Physiologically Beneficial Lighting, Lighting Historic Buildings, and Urban Lighting Plans. In a statement released to announce this partnership, IALD UK regional coordinator Mary Rushton-Beales explains, "I believe that this relationship makes undeniable good sense for both associations. We are giving RIBA Architects the opportunity to learn about aspects of lighting design from professional lighting designers, who operate autonomously from manufacturers. The accreditation procedure is stringent and critical and the content of seminars is relevant. We are really excited to be associated with RIBA."

For more information go to RIBA's website at www.riba.org. **ED**

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LIGHTFAIR INTERNATIONAL 2004

ONE WORD: DAYLIGHT

EMILIE W. SOMMERHOFF

"I just want to say one word to you ... just one word." — Mr. McGuire (Walter Brooke) to Benjamin Braddock (Dustin Hoffman)
"Yes, sir." — Ben
"Are you listening?" — Mr. McGuire
"Yes, sir. I am." — Ben

Daylight. Or so the organizers of Lightfair 2004 might advise young Ben Braddock, the slightly bewildered hero in the classic film *The Graduate* (1967), if they cornered him at a party today. The suggestion is certainly more inspiring than "plastics." It also offers hope that at least this industry is attempting to correct some of the world's wrongs.

**WHAT	WHEN**	Lightfair Daylighting Institute 3|29 – 3|30
	Lightfair Institute 3|29 – 3|30
	Trade Show + Conference 3|31 – 4|2
WHERE	Las Vegas Convention Center
MORE INFO	www.lightfair.com

The annual show, which has diligently served the lighting design community for 15 years, has made a major addition to its educational offering this year: the Daylighting Institute. All-day courses on Monday, March 29 and Tuesday, March 30, will cover daylighting design practices at both the beginner and advanced levels. Moreover, during show hours on Wednesday, Thursday and Friday, appropriate manufacturers will exhibit together in the Daylighting Pavilion; a significant number of companies new to Lightfair, including shading, fenestration and skylight manufacturers, have already taken space in the pavilion. Other companies like Alanod, with standard lighting offerings as well as products directed at harvesting natural light, will exhibit in both the main hall and the Daylighting Pavilion.

Organizers have been discussing the daylighting idea for a couple of years as part of an effort to "rebrand and rejuvenate Lightfair," says one committee member. Indeed, manufacturers and designers alike have quietly—or, in some cases, not so quietly—expressed a growing disenchantment with the show over the last few years. Likewise, while the newly introduced Lightshow West, which took place in San Francisco last September, did not hold a candle to Lightfair in terms of content or attendee/exhibitor numbers, that event could still threaten the West Coast players' commitment to Lightfair down the road. Hence, the reinvention may be necessary to ensure the show's success.

Above and beyond this, though, the idea is ripe for the marketplace. The last major conference on the topic took place in 1986, but after an 18-year hiatus, it seems daylighting is back on the industry's menu of hot topics. This is due in part to increasing acceptance of the LEED rating system for sustainable design, which awards points for the integration of daylight. Within the directory of LEED requirements, this is one of the few that actually provides the potential for payback, so "daylighting has gone from being good to being a must-do for the average architect on a LEED project," says lighting designer James Benya, who serves on the Lightfair management and advisory committees and was a large force behind implementation of the new institute.

In addition to this program, the Lightfair Institute has added accredited Masters courses for professionals with more than ten years of experience in lighting. The trade show and main conference—which will take place from Wednesday, March 31 to Friday, April 2—will include 27 seminars. The entire program is authorized for education credits from the AIA, ASID, IFMA, IIDA and IES.

Taught by the industry's leading figures, the lineup from start to finish (which organizers estimate at more than 225 hours of educational opportunities) promises compelling, relevant information. Meanwhile, the New Product Showcase and Awards, cosponsored by Architectural Lighting magazine and Lightsearch, point the way to the year's most important product introductions. Add this to the expected 600 exhibitors and 17,000-plus attendees, and the show is the most efficient and thorough way to discover what is current in lighting design.

An abbreviated schedule of events follows. For the full schedule and more information on exhibitors, travel and hotel arrangements, and registration, go to www.lightfair.com.

SEE THE LIGHTFAIR INTERNATIONAL 2004 SCHEDULE, PAGES 18 AND 19.

Monday, March 29

9 – 5 LIGHTFAIR DAYLIGHTING INSTITUTE
Basic and Masters Daylighting Tracks

9 – 5 LIGHTFAIR INSTITUTE COURSES
Basic Lighting | CRAIG BERNECKER
Intermediate Lighting | DEE GINTHNER, STEFAN GRAF, FRED OBERKIRCHER
The Luminous Analysis of Architecture | DAVID DILAURA
Recommended Practices for Lighting Simulation | LEORA RADETSKY
Lumen Designer: Recommended Practices for Lighting Simulation | LANCE LIVINGSTON

9 – 12 and 2 – 5
LIGHTFAIR INSTITUTE MASTERS
IAN LEWIN on Spectral Effects
GEORGE C. BRAINARD on Health
KAORU MENDE on Design
NAOMI MILLER on the Aging Eye

Tuesday, March 30

9 – 5 LIGHTFAIR DAYLIGHTING INSTITUTE
Basic and Masters Daylighting Tracks

9 – 5 LIGHTFAIR INSTITUTE COURSES
Basic Lighting | CRAIG BERNECKER
Intermediate Lighting | DEE GINTHNER, STEFAN GRAF, FRED OBERKIRCHER
The Luminous Analysis of Architecture | DAVID DILAURA
Recommended Practices for Lighting Simulation | LEORA RADETSKY
Lumen Designer: Recommended Practices for Lighting Simulation | LANCE LIVINGSTON

9 – 12 LIGHTFAIR INSTITUTE WORKSHOPS
Energy Codes Update 2004 | JAMES BENYA
Daylighting: What You Really NEED to Know | MATTHER TANTERI
The Anatomy of the LED | KEVIN DOWLING, GEORGE MUELLER
Retrofit, Relight, Redesign: the 3 R's | FRED HAUBER, STAN WALERCYZK
Are the Challenges of Maintenance, Energy and Code Compliance the End of Effective Retail Lighting Design? | DAVID APFEL, MEGAN CARROLL, RON KURTZ

2 – 5 LIGHTFAIR INSTITUTE WORKSHOPS
Speaking Photometrically | KEVIN HOUSER
Design for LEED Certified Buildings | DORENE MANICCIA, MICHAEL ZEUGER
LEDs Today: Solid State Lighting for Architectural Applications | IAN ASHDOWN, GRANT HARLOW, BRENT YORK
Safe Specs: Specifying & Commissioning Controls | JOSEPH GOOD
Lighting Certification Workshop | WILLIAM DAIBER, FRED OBERKIRCHER, THOMAS SCOTT

Wednesday, March 31

10 – 6 EXHIBIT HALL OPEN

8.30 – 10 SPECIAL EVENT
New Product Showcase & Awards

2 – 3.30 SEMINARS
Understanding LEED & the Impact of Lighting on Sustainable Design | MARC COHEN

Hospitality Lighting: What's Fabulous & Trendy | BABU SHANKAR
LEDs: Innovation, Application, Evolution | STEVE JOHNSON, NADARAJAH NARENDRAN
Techniques in Architectural Covelighting | PETER NGAI

4 – 5.30 SEMINARS
Preserving the Night: A History of Light Pollution, Its Causes, Effects & Solutions | DAVID CRAWFORD, SCOTT DAVIES
Bon Appetite: Techniques for Successful Restaurant Lighting Design | DAVID SINGER
Health Care Providers See the Light & Want the Light | JILL KLORES

Thursday, April 1

10 – 6 EXHIBIT HALL OPEN

8.30 – 10 SEMINARS
Lighting & the National Electrical Code | ROBERT SCHENTUR
Light as the Link Between Ambiance & Humans | SUSANNE WEBER
Asian Influence in Design | CHOU LIEN
The Great Debate: T5 vs HID | JAMES BENYA (MODERATOR), JOHN GREEN, DAVID PARKANSKY, PAULA ZIEGENBEIN

10.30 – 12 SEMINARS
Daylighting Controls | RICHARD MISTRICK, DOUG PATON, FRANCIS RUBINSTEIN
Creating One Emotion | PAUL GREGORY
The Illumination of Glass | JAMES BANEY, MICHAEL DIBLASI, ROBERT SHOOK

2 – 3.30 SEMINARS
Designing & Implementing an Urban Lighting Master Plan | MARC MORFEI, SANDRA STASHIK
Designing for Humans | MICHAEL ESSERS, MIACHEL ROHDE
Lighting Software Help Desk | MICHAEL CASSIDY, MATT FRANKS
Functional, Friendly Lighting for the Aging | DAWN DE GRAZIO

4 – 5.30 SEMINARS
Lamp & Ballast Update 2004 | JAMES ANDERSON, ROY SIERLEJA, HOWARD WOLFMAN
Art of Lighting & Space | NOBUHO NAGASAWA
Whats, Hows & Whys of Residential Lighting | STEVEN KLEIN

Friday, April 2

9 – 3 EXHIBIT HALL OPEN

8.30 – 10 SEMINARS
Lighting for Videoconferencing Today | ANDREW BELDECOS, BROOKE CARTER, RENEE COOLEY, LEE HEDBERG, JAMES YORGEY
Surfaces & Sources: To Light or Not to Light | ROBERT PROUSE
Selling Productivity: How Lighting Can Satisfy, Stimulate & Motivate | CAROL JONES

10.30 – 12 SEMINARS
Roadway Lighting Research Past, Present & Future | CARL ANDERSEN, RONALD GIBBONS, RICHARD STARK
The E Factor: Creating Emotional Response through Lighting | CRAIG BERNECKER
Love Your Contractor: Partnership in Design Build | ROBERT LANTEIGNE

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"Bridges in Light" Calls Our Industry to Action

JAMES BENYA

IN OCTOBER 2003, THE LIGHTING RESEARCH CENTER HELD "BRIDGES IN LIGHT: THE FIRST CONTINENTAL CONGRESS OF LIGHTING" in historic Saratoga Springs, New York. It attracted a moderately sized audience of lighting industry leaders, dominated by major manufacturers. Among the many different conferences in lighting, this promised the most thoughtful, if not weighty, content in years. Only the US Department of Energy's "Vision 2020" program has recently attempted to address topics of long-term importance to the industry as a whole, and 2020 was more technical than philosophical or financial.

Not long into the opening presentation by Dr. Paul H. Schoemaker, chairman and CEO of Decision Strategies International, the theme of Bridges in Light became clear. Schoemaker, a business strategist and lecturer, told attendees what many of us have already realized: lighting is becoming "commoditized," thereby causing a potential loss of opportunity and profits. To help address it, he described a modern approach to business strategy called "scenario planning," in which the range of a current trend is evaluated against the range of uncertainties. He added many thought-provoking anecdotes to help understand related concepts and pointed to the important, but often ignored, "weak signals" of change. In short, he warned attendees that their industry needs to "reinvent" lighting to insure prosperity. (See page 72 for industry commentary on the issue of "commoditization.")

After a break, architect and visionary—and green entrepreneur—William McDonough challenged the audience to consider the broad environmental implications of modern industry and its products. While he did not spend a lot of time on lighting (or daylighting), McDonough established at least one possible future in which the sustainable and environmental impacts of mankind's undertakings are thoughtfully evaluated. Following McDonough was Dr. Alfred Lewy of the Sleep Disorders Clinic at Oregon Health Sciences University. Lewy is a leader in the study of circadian rhythms, seasonal affective disorder (SAD) and light, and he presented a clear, concise synopsis of how the human endocrine system works with respect to light and darkness. There

The opening speaker at the conference told attendees what many of us have already realized: lighting is becoming "commoditized," thereby causing a potential loss of opportunity and profits.

Scenario Planning Matrices Developed by Bridges in Light Attendees

UNCERTAINTY: Will the change in customer perception of lighting's value be ... ?

TREND: Will the coordinated industry strategy we're talking about actually happen?

	Moderate	Profound
No	Status Quo	Increased Value
Yes	Efficiency Gains	New World

UNCERTAINTY: Will the change in societal attitudes toward sustainability be ... ?

TREND: Will the current industry trend toward technological advancement be ... ?

	Moderate	Profound
Moderate	Status Quo	Enlightenment
Significant	Efficiency Gains	Reinvention of lighting industry

Dr. Paul Schoemaker, the opening speaker at the Bridges in Light conference, suggested the lighting industry, in developing its future strategy, use an approach called "scenario planning." A matrix two columns wide by two rows high is used to present the range of a major trend ("Y" axis) against the range of a major uncertainty ("X" axis). The result is four possible scenarios per matrix that describe the range of what "could" happen. The above graphic illustrates the two primary matrices arrived at by conference attendees.

followed a brief presentation by Ross Malone, CEO of RETX, a company in the load-management business. The morning finished with three distinguished speakers on LEDs: Shuji Nakamura, the inventor of the blue LED, George Crawfords of Lumileds and Yoshi Ohno of the National Institute of Standards and Technology.

After lunch, attendees broke into groups, each charged with discussing and developing scenario plans for one of four of lighting's major industries—residential, healthcare, commercial and outdoor. The results of a long afternoon of debate were presented, and in turn, summarized by the executive leaders of the conference using the scenario planning technique described by Schoemaker. In brief, a matrix two columns wide by two rows high is used to present the range of a major trend ("Y" axis) against the range of a major uncertainty ("X" axis). The result is four possible scenarios per matrix that describe the range of what "could" happen. The two primary matrices arrived at by the Bridges in Light attendees are illustrated in "Scenario Planning Matrices" on Page 21.

In other words, if it is to survive, the lighting industry must (a) work together to develop and produce a coordinated strategy and (b) make significant technological advances. To address the uncertainties, attendees agreed, the industry must expand the perceived value of lighting; a shift in social values towards sustainability will play a very significant role in this expansion. Other trends discussed included price competition, an aging population, growing awareness of light and health, the need to eliminate mercury from the environment, growing regulatory impacts, market globalization, global warming, electrical system capacity and personalization. Uncertainties included the economy, Asian competition, energy issues and business model differences.

CRITIQUE

I am a long-time admirer of the Lighting Research Center. The organization is unparalleled in its vision, reach and impact. So, in reading the Bridges in Light brochure, I suspected a program of profound significance, and overall, the program delivered. It helped to expose our most overriding trend—commoditization—and to point out that the customer's perception of value is probably our biggest uncertainty.

Attendees certainly benefited from the basic planning and analysis skills taught by Dr. Schoemaker, and his reminder to consider all scenarios when developing a successful business. Among the other presenters, Lewy was easily the most instructive, delivering the single best short lecture on human photobiology I have heard. But, while I enjoyed McDonough because of a personal interest in the environment, he was clearly giving the speech that goes with his new book, *Cradle to Cradle*. Malone's presentation about load management was the least applicable to the conference, resembling a marketing pitch rather than compelling commentary.

Then there was the LED trio. It seemed paradoxical, after Dr. Schoemaker had told us to listen for "weak signals," to then be given *three* presentations on only one very, very strong signal. While there is no question that solid-state lighting will play a role in our future, I think there are major technical hurdles that

(CONTINUED ON PAGE 24)

:Fabbian

Twirl *design:* Francesco Lucchese

Cubetto
design:
Roberto Pamio
& associates

Jazz
design:
Roberto Pamio
& associates

Aster
design:
Giampiero Derai

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stand between consumers and a house full of LED fixtures. At least the limitations of LEDs—including life, heat and color—were addressed with some honesty by the speakers. Instead of the presentation by Malone or two of the three LED presenters, it would have served the industry better to hear about solar energy, daylighting, fuel cells, induction lamps, dark skies, and other major trends directly related to lighting. For example, no one discussed the rapid movement of lighting manufacturing to China, Mexico and other places where costs are low and intellectual property is ignored, two key ingredients in commoditization.

But by far the largest missing segment of the industry in the day's events was lighting design. The prosperity and "fun" of lighting comes in its application, and lighting designers in particular play a pivotal role in creating the perception of added value. The products and concepts lighting designers started using 20 or more years ago—attractive luminaires, accent lighting, dimming systems, themed design—have fueled our industry's development. It surprises me that the LRC would not turn to those who created the last wave of prosperity—lighting designers, as well as architects and interior designers—to help create the next wave. Without our passion, creativity and skills, lighting is indeed doomed to a future of commoditization from which the industry will never recover. Without design, the "value proposition" of lighting is a commodity, always was, always will be. ■

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Dr. Mark Rea, director of the Lighting Research Center

Professor Russell Leslie and members of the faculty and staff

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Zia Eftekhar, president of Lightolier, director and vice president of the Genlyte Group

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JF Simard, president and general manager of Lumec, Inc.

Peter Smith, acting president of the New York State Energy Research and Development Authority (NYSERDA)

James Benya is a professional lighting designer and principal of Benya Lighting Design, West Linn, Oregon. He also serves on the editorial advisory board of A|L.

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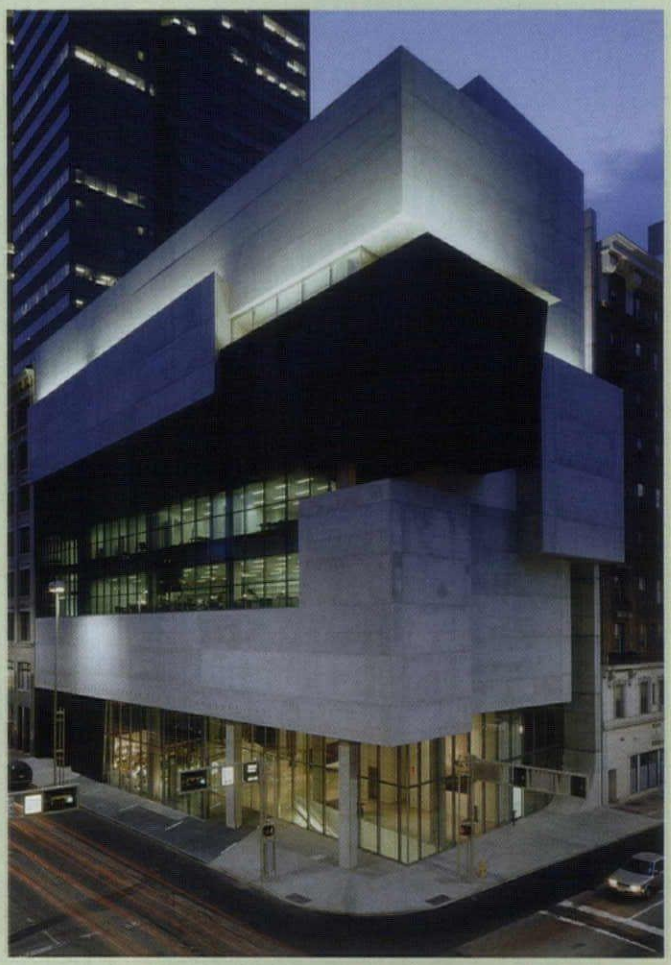
THE ROSENTHAL CENTER FOR CONTEMPORARY ART (CAC) is a series of firsts: Zaha Hadid's first building in the United States, her first project on an urban site, her first museum, and her first collaboration with lighting design firm Office for Visual Interaction (OVI). From the beginning of the project, OVI, founded by principals Jean Sundin and Enrique Peiniger, set out to determine the project's fundamental architectural statement and how to express that with light. "We wanted to know the vocabulary and visual metaphors," explains Peiniger.

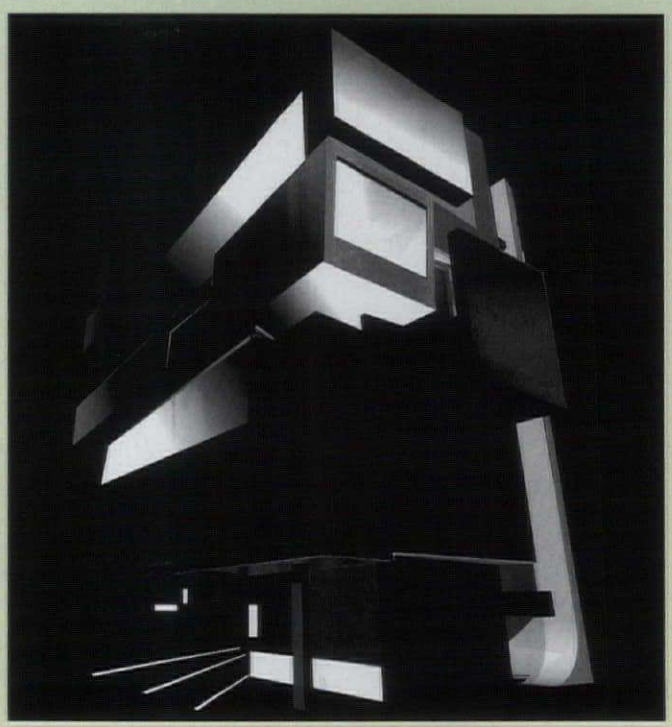
Reinforcing the sense of movement inherent in Hadid's architecture, the approach of the building's lighting scheme is, as Sundin characterizes it, one of "dynamic acceleration." Throughout the building, luminaires are spaced to create "a moving dynamic that runs along the length of the glass façade." This occurs in the lobby, for example, where the line between interior and exterior space disintegrates through the double-height glass curtain wall, and the city grid is pulled into the building and transformed from horizontal (floor) to vertical (back wall) plane in what Hadid calls the "urban carpet." Fiber optic slots in the sidewalk continue diagonally across the lobby floor; across the ceiling, bare fluorescent strips in coves run in the east-west direction. Light washing down the "urban carpet" wall from a skylight, and simple fluorescent channels in the stair volumes themselves, silhouette the staircase. This pattern of luminaires spaced far apart and then increasingly close together, whether it is in the lobby or gallery spaces, responds to the architectural dialogue of movement, multiple perspectives and interlocking spaces.

Discussion also centered on the articulation of volumes and their scale through the use of materials. As Hadid describes in her project statement, "The fundamental concept is a jigsaw puzzle of diverse exhibition spaces: long, short, broad or tall spaces, each with different lighting conditions." OVI's challenge was to develop a lighting strategy and incorporate a ceiling. Each space has its own lighting plan. Different lamps correspond with the variable ceiling heights, which range from 8 feet to 25 feet. A metal grating material with a heavy, open pattern defines the high ceiling volumes. In low condensed spaces, the ceilings are expressed with more compressed materials such as drywall. On the exterior the building's concrete and aluminum volumes are articulated with concealed linear florescent strips located at the parapets.

OVI's studio approach, and even the name of the firm, convey its design philosophy—light as a means of architectural expression. For the Rosenthal Center, as it does with other projects, OVI creates a visual hierarchy of light that responds to the articulation of spaces within the building. The result is a complete integration of light and architecture. **ELIZABETH DONOFF**

ARCHITECT: Zaha Hadid Architects, London
LIGHTING CONSULTANT: Office for Visual Interaction, Inc., New York
IMAGES: Roland Halbe (top); OVI (bottom)





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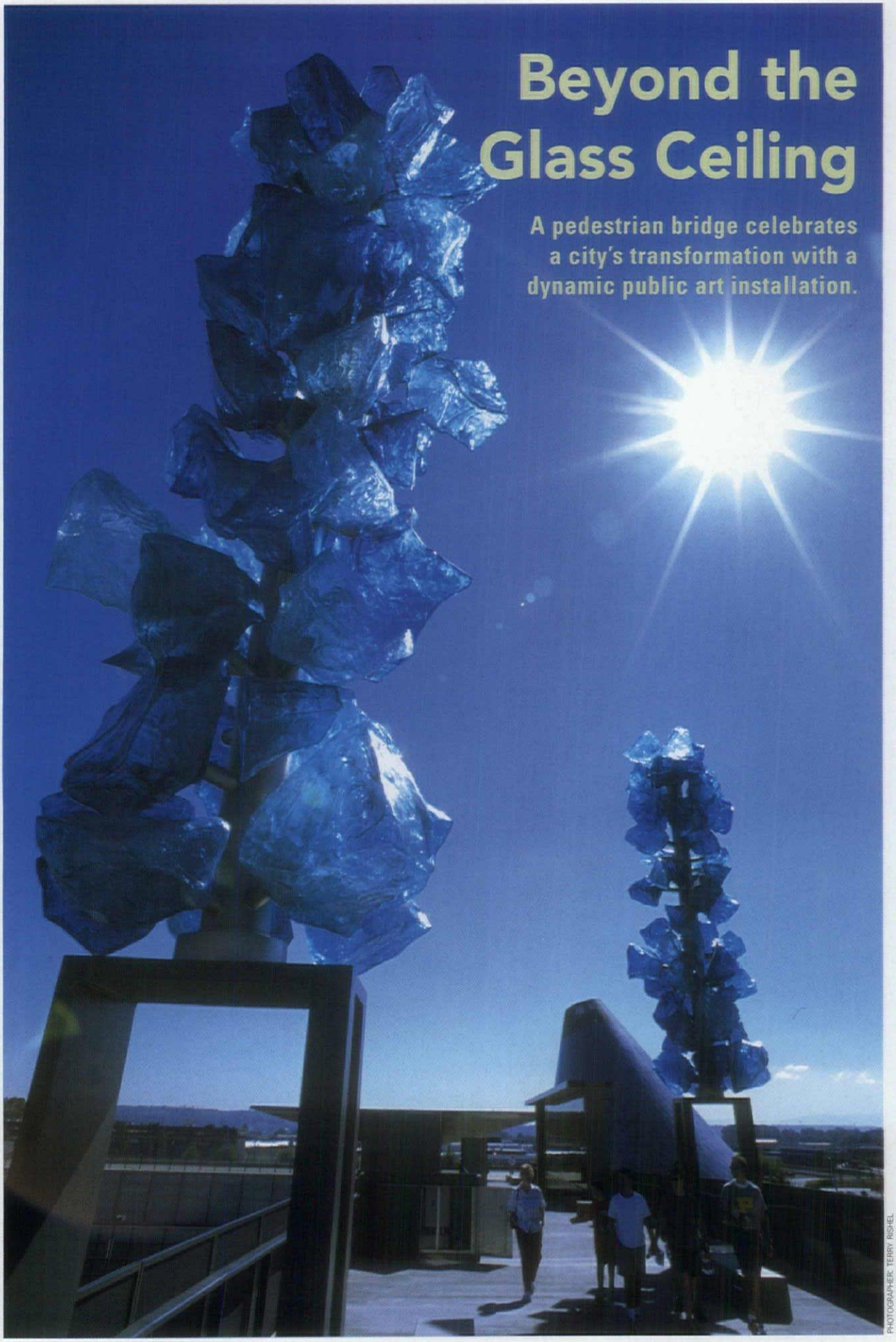
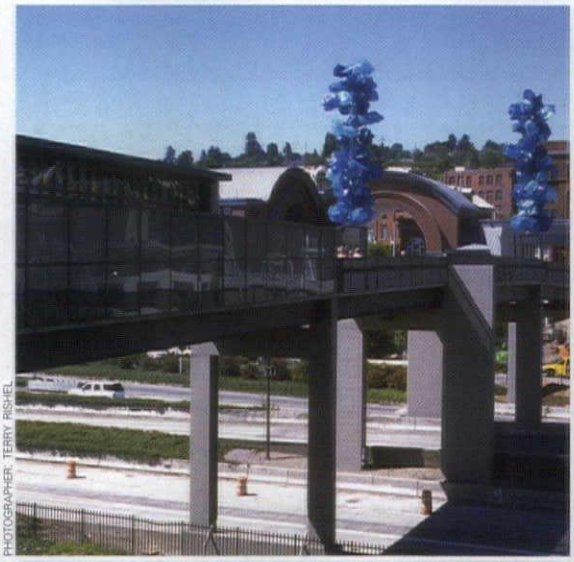
Beyond the Glass Ceiling

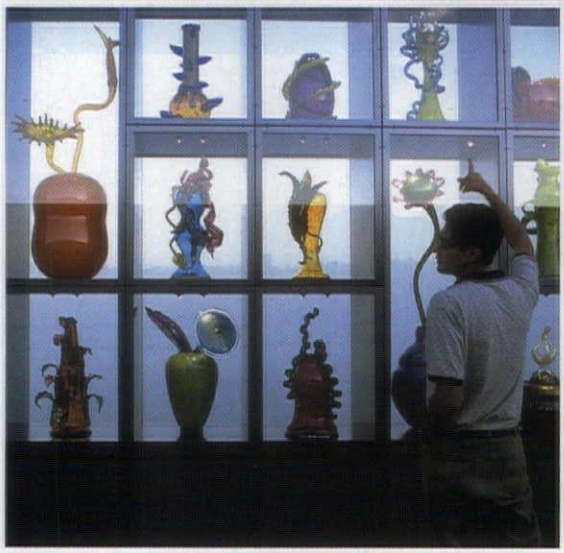
A pedestrian bridge celebrates a city's transformation with a dynamic public art installation.



PHOTOGRAPHER: TERRY RISHEL



PHOTOGRAPHER: TERRY RISHEL



The Crystal Towers (facing page and top left) provide Tacoma with a new landmark. The bridge columns extend 6 to 17 feet above the deck to become the support casings for the pavilions. The display cases are fabricated from blackened stainless steel with a non-reflective satin finish. The Seaform Pavilion (above) allows visitors an intimate experience with the artwork. Visitors are not allowed to "see" the glass until they enter the pavilion, where they are met with an explosion of color and form. In the Venetian Wall (left), selections from Chihuly's *Venetians, Ikebana* and *Putti* series are illuminated with natural light and a fiber optic system.

AMIDST THE BACKDROP OF A UNIQUE SET OF SITE CONDITIONS—an interstate highway, railroad tracks and a waterfront—sits a testament to the process of collaboration, and a native son's commitment to his hometown of Tacoma, Washington. The result of a unique public/private initiative, the Chihuly Bridge of Glass was commissioned by the neighboring Museum of Glass and presented to the city in 2002. It links Tacoma's four major cultural institutions: the Washington State History Museum, Union Station, the Glass Museum and the Tacoma Art Museum—all part of the city's initiative toward renewal that began in the 1980s. The 500-foot-long, 20-foot-wide pedestrian structure is home to three unique Dale Chihuly installations and the largest public display of his work: the Seaform Pavilion, the Crystal Towers and the Venetian Wall.

The bridge was originally conceived by Chihuly, and designed in collaboration with Arthur Andersson of Austin-based Andersson-Wise Architects, designer of the adjacent Washington State History Museum. An early concept involved a triangular tube of colored glass—a virtual kaleidoscope; but it was not structurally feasible. As they continued to investigate forms, Andersson suggested to Chihuly the idea of pavilions that would each house a "different experience with glass." Chihuly liked the idea, and the bridge became a set of controlled objects—the pavilion-like display cases—in which the glass is just allowed to "be." The result is an interesting juxtaposition between the fluid glass forms and the square display cases. As Chihuly became intrigued with the possibility of large-scale installations on the bridge, the original concept of five small structures was reduced to three in the final scheme. But the idea that the pavilions would provide varying degrees of enclosure, sheltering visitors from the noisy freeway below, always remained intact.

INTUITIVE PROCESS

The San Francisco offices of Horton Lees Brogden Lighting Design (HLB), under the direction of project principal Angela McDonald, served as the lighting consultant to Andersson-Wise Architects. HLB's goal was to navigate the technical requirements for the pavilions and create a museum-like experience, while incorporating the Chihuly Studio's approach to light; the lighting also had to foster a safe pedestrian space.

The pavilions' lighting schemes were driven by the Chihuly Studio's experience with glass and its response to different lighting conditions. A lighting solution is incorporated and discussed from the beginning of every Chihuly project; it is part of his process, and this awareness stems from the extreme reflectivity of the materials he works with—glass, ice, water and plastic. It is an intuitive process, he says, based on site and conditions, light, reflection and optimum visual opportunity. Full-scale mock-ups are constructed in Chihuly's studio prior to actual installation. The Crystal Towers, for example, required three mock-ups before final construction.

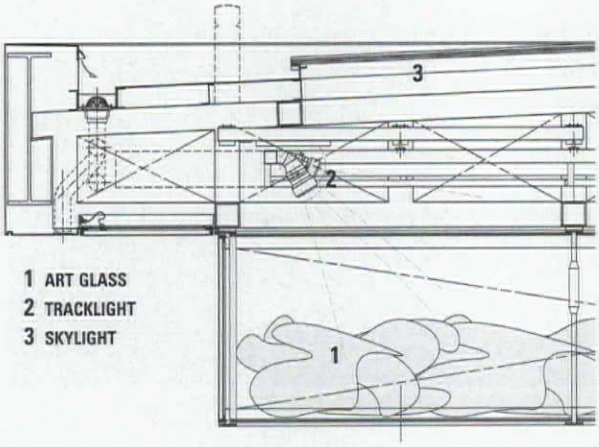
PEDESTRIAN JOURNEY

From either end of the bridge, visitors are met by a seductive threshold, the glass itself. The challenge for the Seaform Pavilion, located at the east end of the bridge, was to create a secure environment for the 2,364 pieces from Chihuly's *Seaform* and *Persian* series, while controlling the amount of daylight backlighting the art. The art glass is placed on top of a 50-foot-by-20-foot plate glass ceiling. Above the art, rows of dimmable fluorescent lamps and halogen accent tracklights provide additional light on cloudy days and illuminate the pavilion at night. An upper skylight built of translucent gray glass protects the equipment and art from the elements. The tinted glass sidewalls of the pavilion allow visitors to immerse themselves in the space without visual distraction.

The midpoint of the bridge is marked by two towers made of 63 polyvitro crystals, a polyurethane material suited to outdoor applications, first used by Chihuly in his *Light of Jerusalem* installation in 2000. The towers rise 40 feet above the bridge deck and are uplighted with six 1000W metal halide floodlights.

The 65-foot-long, 15-foot-tall Venetian Wall houses 109 glass pieces, some of the largest blown-glass objects ever created. The bulletproof display case uses a super clear, low-iron glass with a polyvinyl butelyn layer in between. The challenge was to balance the display, and ensure that the art would be at home in both natural light, and with the specially designed fiber optic system. In order to prevent condensation and minimize dust collection, clean, dry air is continually circulated through the cases.

Chihuly's work is an exploration of color and form, of the spatial interaction between color and light, and of the transition between object and architecture. Andersson-Wise's challenge was to create a backdrop worthy of the art in these pavilions. HLB's task was to use the artist's glass as "light fixtures" in a way that conveyed his ideas about the media. The pavilions offer an intimate environment in which visitors can interact with the glass, against the charged atmosphere of nearby buildings, cars and trains below, and the waterfront beyond. Tacoma is left richer with an inviting public space and a native son's generosity. **ELIZABETH DONOFF**



SEAFORM PAVILION SECTION DETAIL 2'

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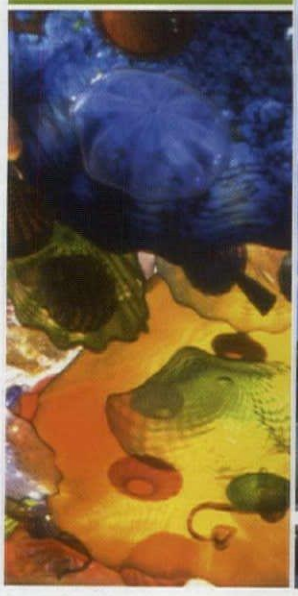
In the Seaform Pavilion construction detail (top), the art glass is suspended mid-air on a plate glass ceiling, and illuminated from above. The lighting designers created a staggered path of light that gives distinct spatial definition to the different areas on the bridge. Embedded lights in the poured concrete benches illuminate the pathway without populating the bridge with additional fixtures (bottom).

DETAILS

PROJECT Chihuly Bridge of Glass, Tacoma, Washington
OWNER City of Tacoma, Washington, and Museum of Glass
ARTIST Dale Chihuly, Seattle
ARCHITECT Andersson-Wise Architects, Austin, Texas
LIGHTING DESIGNER Horton Lees Brogden Lighting Design, San Francisco, and Pacific Lightworks, Portland, Oregon
PHOTOGRAPHERS Scott M. Leen, except as noted
COST $10.7 million (bridge); $1.5 million (pavilions); $12 million (art)

MANUFACTURERS	APPLICATION
Bega	Crystal Tower floodlights
Edison Price	Seaform Pavilion tracklight
Lutron	Seaform Pavilion dimmers
Special-T	Venetian Wall fiber optic system
Bega	concrete bench uplights

Q + A with artist Dale Chihuly



A|L: How do you approach working with materials that have reflective qualities?
DC: As you say, all of the materials I like to work with—water, plastic, glass and ice—have the qualities of light, transparency and reflection. In fact, I keep looking for other materials that have the same qualities and have yet to find any. In a sense, I approach them the same, because I am asking them to respond to my use of their qualities. I suppose the real difference is in the outcome of the project—because each of the materials has different limits of what I can ask of it.

A|L: How is light considered in the creation of a piece?
DC: How the materials respond to light is one of the key reasons why I use these materials. It is a major factor, in conjunction with suitability for the project.

A|L: What are the studio's criteria for illuminating glass? Are there overall principles found in every installation, or does it vary from project to project?
DC: Each installation is lighted to meet my standards and the needs or qualities of the site. But as a rule, I have my team use narrow beam spots. But I have used many different fixtures as needed. One rule I keep is that unless I am working with ice, I do not use colored lights.

A|L: How do the use of daylight and electric light sources contribute to the display and transformation of the work?
DC: First, I do not have daylight in my museum or gallery installations if possible. I like the concept of the black box. But I do understand that people do not just live in black boxes. We put the lighting on dimmers so that during the day when there is light in the space the fixtures can be lowered, and when it is dark we increase the lighting.

A|L: Could you elaborate on the term "optimum visual opportunity"? What does this mean for the work and creating environments?
DC: Artists want their work shown in the best possible environment. For me, that means that a great deal of effort must go into the lighting to make the work come alive.

A|L: What was your artistic vision/concept for the bridge?
DC: First, I liked the challenge of doing something architecturally that I had never tried before. Next, I wanted to create something in an open public space. I wanted to address the issue of sustaining a person's interest along a 500-foot-long pedestrian bridge—what would keep them moving forward and what would have them come back, and at the same time create something useful. I saw it as a journey.

A|L: What was the working process between the Chihuly Studio and Andersson-Wise Architects?
DC: Arthur Andersson and I worked together on various projects before the bridge. I welcomed the partnership, as I have always respected his opinions. Because of the challenge I wanted someone I was comfortable working with on the creative and problem-solving end of the project.

A|L: How was the type of work selected to be part of the bridge pavilions?
DC: I wanted to work with two installations, which had always been the favorites in my various museum exhibitions. The two I chose were the *Venetians* and the *Seaform Ceiling*. Then in the middle of the bridge I wanted to expand on the sculptural concept working with plastics that I had developed for my exhibition in Jerusalem.

A|L: How did you want the experience of this place and people's interaction with your work to change from near and from afar and during the bridge's transformation from its day to night identity?
DC: I guess the main answer for this question is that I wanted the bridge to have the same type of impact on the viewer, whether it was near or far, light or dark. That is one of the real successes of the bridge, that constant sense of "wow."

A|L: Did any of your existing ideas about glass and light change with the creation of this bridge project?
DC: I cannot say that any of my ideas about the materials or light changed with this project, but I did have another chance to control the environment, even when the works are outside.

Light Industry

Façade materials and lighting connect a commercial center to local history.

AFTER YEARS OF ECONOMIC MELANCHOLY, THE SPANISH CITY OF Bilbao has become a hot spot on the cultural map. The Frank Gehry-designed Guggenheim Museum, completed in 1997, opened the floodgates of popular recognition, but the city's architectural dossier also includes Norman Foster's contribution to the metro system, a Santiago Calatrava-designed pedestrian bridge and airport terminal and a riverfront master plan by Cesar Pelli. The list is testament to the breadth and depth of quality architecture's impact on urban renewal.

Indeed, the arms of Bilbao's recent revitalization have stretched to city neighborhoods like Barakaldo. Re-envisioned as a commercial center, the area was once known for steel fabrication and shipbuilding; this contextual history provided the perfect inspiration for Jay Valgora, design principal of the New York City-based WalkerGroup. Charged with designing Barakaldo's Max Ocio Commercial Center, the architect and his team looked to the factories and steel mills that had formerly characterized the neighborhood. Rather than adhering to a predictable architectural style, Valgora believes "every project must come out of a particular space and culture."

Valgora's approach to architecture is also informed by what he terms as an obsession with both materials and lighting. For him, the two are inextricable linked: "I'm very interested in their interaction, in backlighting materials, in using light to create something beautiful out of something ordinary." His designs employ "strong, unusual combinations of materials," or just off-the-shelf ingredients envisioned in a new way; well-designed lighting then draws attention to these specifications. It is in the amalgamation of materials chosen by Valgora and his team, and a lighting treatment developed by New York City-based lighting designer Dusti Helms, that the design of Max Ocio acknowledges the area's industrial history, while expressing its future as a commercial center.

MATERIAL DEPTH

The building's façade materials are taken directly from an industrial vernacular: corrugated, galvanized aluminum; an inexpensive structural U-glass; Corten steel (the rusted surface imparts a velvety texture); and mullionless glass exposing large steel trusses. A native of Buffalo, New York, Valgora grew up surrounded by the dramatic visuals of industrial architecture; more than a surface nod to its heritage, Valgora wanted Max Ocio to have the same bold forms. The materials provide a shell, but it is the application of light that gives the architecture its depth and a striking presence.

In developing a lighting approach for Max Ocio, Helms found inspiration in old industrial photographs—depicting, for instance, the sparks caused by a welder's torch on metal or an oil tank's winding skeletal staircase illuminated from below. Helms points out that the colorful exterior lighting is drawn from the dual light sources and resulting color temperatures frequently found in industrial environments: "High pressure sodium casts a warm orange tone versus mercury vapor, which is cooler, greener," she explains. The individual colors also accentuate the diverse architectural forms. Lastly, the colorful face has a practical agenda: it creates a "distinctive identity," expressing the building's purpose as an entertainment and retail center—an important task since the municipality prohibited exterior signage.

The lighting sources, like the other materials on the project, are perfectly at home in an industrial setting. They are the simplest of components (fluorescents in colored gel sleeves, recessed uplights, linear fluorescent floodlights, neon), and yet, they are successful in emphasizing the textures and forms so critical to the structure's character—in part because Helms is also highly aware of materials in her design process. "The first things I ask about are the colors, materials and textures, because that is what informs the lighting; it's how you select sources, how you position things." The spotlights are angled to rake light over the corrugated façade and thereby enhance the undulating skin. Likewise, spotlights and surface-mounted fluorescents fitted with color filters illuminate the U-glass-encased elevator tower and bridge, silhouetting both the façade materials and the people inside. Simple light sculptures—composed of exposed fluorescents in color sleeves and mounted on a panel with perforated metal in front—add another layer of texture and illumination, announcing the building to the adjacent highway.

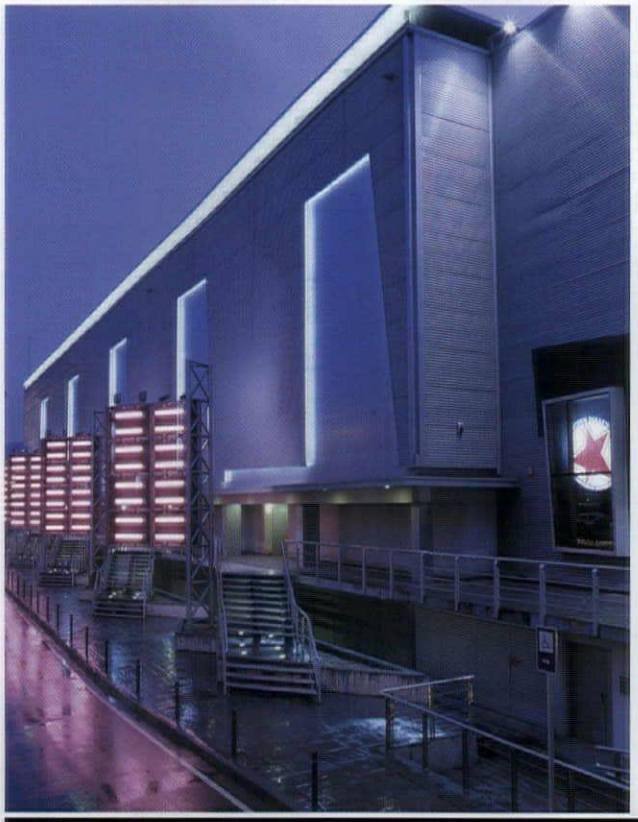
Lighting's marriage with form is most apparent in the forced-perspective stairwell, with its floating treads and Corten steel backdrop; it is illuminated from below with simple fluorescent tubes. "We wanted to pull the stair out sculpturally," says Valgora, who was inspired by the oil tank image Helms dug up. "We wanted to light it as an architectural feature; but also experientially, so as people walk up, they cast constantly shifting shadows. They interact with both the architecture and lighting." Beyond its visual effect, the illuminated stair serves a commercial purpose: shoppers are drawn to the development's upper levels, reinforcing their movement through the building and, ultimately, Barakaldo's successful transition from ship building to commercial center. **EMILIE W. SOMMERHOFF**







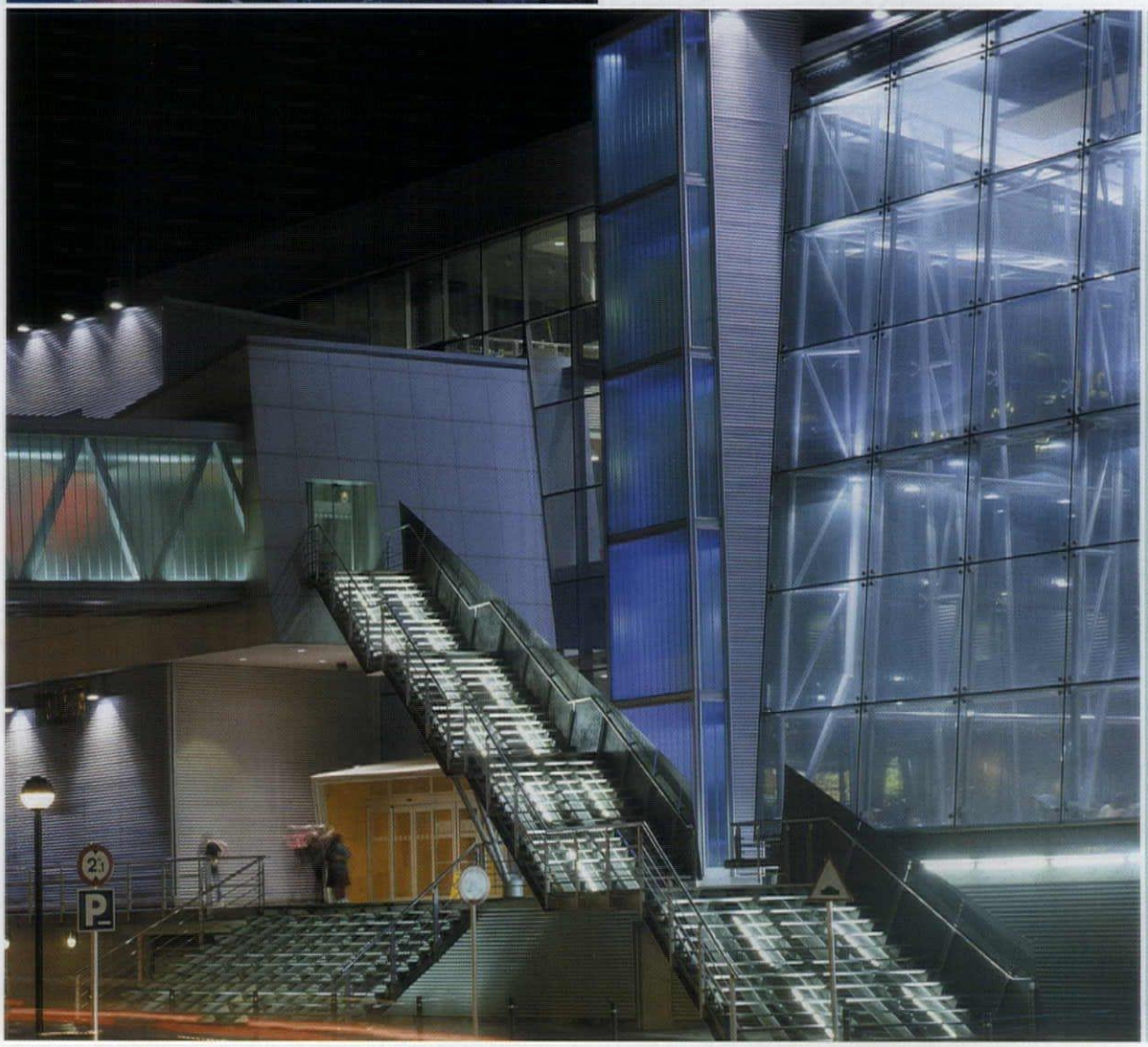

At the Max Ocio Commerial Center, light and textured materials emphasize architectural form and the area's industrial heritage. Photographs of sparks and an oil tank's winding stairs (this page) provided inspiration for lighting consultant Dusti Helms.



DETAILS

PROJECT Max Ocio Commercial Center, Bilbao, Spain
OWNER ING Real Estate
ARCHITECT WalkerGroup, New York City
ASSOCIATE ARCHITECT LKS Enginieria, Gipukea, Spain
LIGHTING CONSULTANT Dusti Helms, New York City
PHOTOGRAPHER Michele Curel, Barcelona
COST $12.7 million

MANUFACTURERS	APPLICATION
Hydrel	Uplights in exterior stairwell
iGuzzini Lighting	Exterior crown uplights, graphic panel and accent lights; bridge floodlights and recessed uplights; and stair tower
Martin Architectural	LED accent lights
Phillips Lighting	Decorative panel backlights



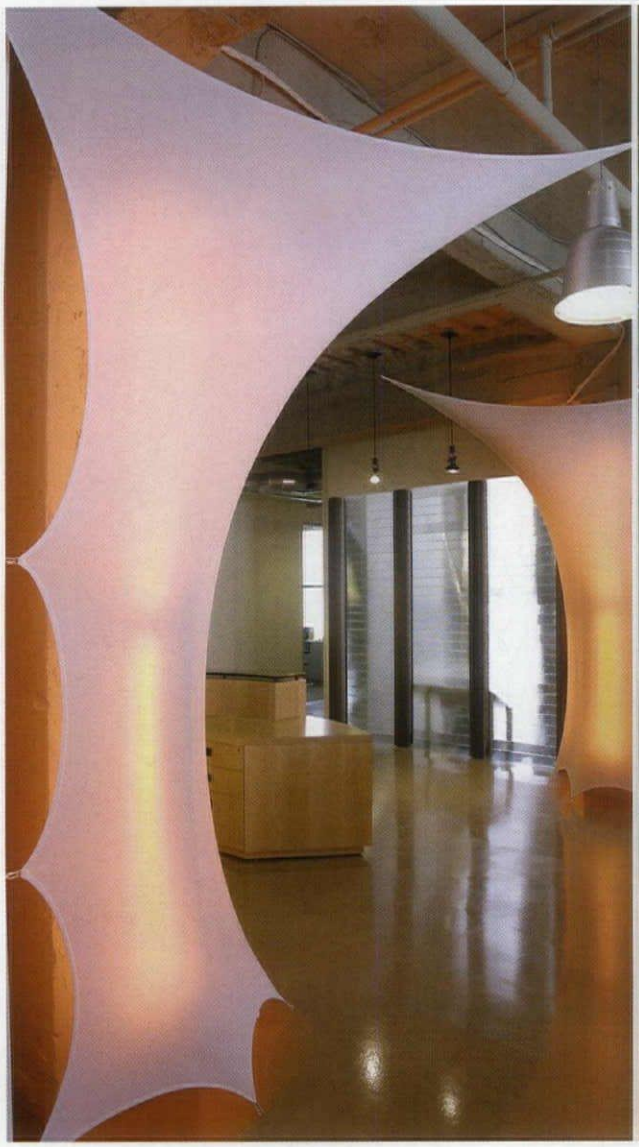
ILLUMINATING DETAIL

Fabric and light sculptures provide character to a materially modest loft-style office.

WHEN COLLABORATE, AN INTERNATIONAL TELEVISION AND PRINT AD AGENCY based in San Francisco, chose the Huntsman Architectural Group to design its new office, the challenge was to transform a 5,000-square-foot space in a 1909 office building, while meeting a limited construction budget. Wishing to set itself apart from traditional advertising agencies, Collaborate welcomed the architects' suggestions for designing the new office to reflect the agency's creative approach.

When Collaborate leased the space in 2001, it had already been stripped down to its brick walls and concrete ceiling and floor. The partners liked the natural lighting from the large operative windows in the historic building. The raw interior was also appealing because it recalled San Francisco's dot-com boom, when such interiors seemed to express the dynamism that came from ever-escalating business. With the boom over, the cheerful chaos of those offices could be seen to send the wrong message; yet Collaborate's partners felt that such materially honest interiors, if well organized and given some sophisticated design elements, would convey the agency's forward-looking stance.

The Huntsman design team succeeded in combining historic context with contemporary drama by installing a procession of light sculptures along the corridor by the inner wall of the office. The sculptures by Gisela Stromeyer Designs—created specifically for this project—are made of white Lycra fabric stretched and fastened to ceiling, floor and wall surfaces with simple eyelet screws and carabiner key rings. Originally, the designers envisioned the fabric sculptures suspended a few feet below the ceiling and lit from above; however, the client did not want an overhead light source in the studio and so the architects suggested moving the sculptures to their current position. Not only did this

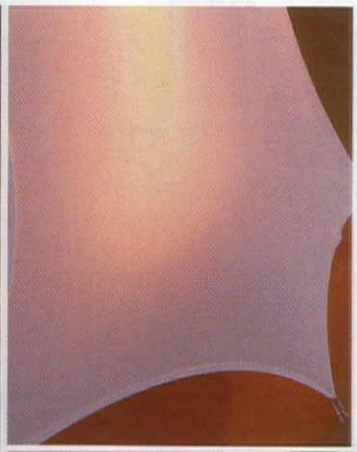


Fluorescent bulbs covered in orange polycarbonate sleeves animate tensile fabric structures to create a dramatic effect for Collaborate Agency's offices. Spotlights showcase the company's work at the reception area (center), while large operative windows provide an abundance of natural light for private offices (below right). A louvered glass wall visually connects the conference room to the rest of the office (right).

adjustment lower costs, but the highly polished concrete floor enhances the pooling of light at the columns' base. The light sources are surface-mounted T5 fluorescent tubes with orange poly sleeves. The warm glow diffused by the translucent fabric is undeniably cheerful. Should a different colored glow become desirable, the poly sleeves can be easily changed.

The ceiling conditions presented another series of unique lighting challenges. With its visible array of ducts and wiring, the open ceiling in the corridor area curtailed any opportunities for recessed fixtures. Instead, pendant luminaires of clear anodized aluminum with a polished satin finish and a matte interior were used. In the conference room, the open ceiling could not accommodate the lights necessary for graphic presentations, so the architects devised a suspended acoustical ceiling to house dimmable and adjustable rectangular downlights.

The artful union of color-wrapped fluorescent light fixtures and streched Lycra to produce glowing columns that spread light beyond their spatial limits has given the office interior an unexpected drama. Project designer Alison Smith believes that combining alternative and otherwise standard materials to produce exciting lighting effects has become a strong trend, promising more adventuresome combinations for the future.
SALLY B. WOODBRIDGE



DETAILS

PROJECT Collaborate Agency Office & Studio, San Francisco
ARCHITECT Hunstman Architectural Group, San Francisco
FABRIC STRUCTURES Gisela Stromeyer Design, New York City
PHOTOGRAPHER David Wakely, San Francisco
COST $47 per square-foot

MANUFACTURERS	APPLICATION
Focal Point	Pendant fixture in open office
Lithonia	T5 low-profile fluorescent bulbs in fabric sculptures
Special FX Lighting	Colored polycarbonate sleeves

material exploration

A planetarium juxtaposes the materiality of its daytime image against a nighttime presence wholly defined by light.

AFTER LOCATION, PRESENCE IS EVERYTHING—AT LEAST WHEN COMPETING FOR public and patrons, as so many museums are these days. For architecture firm van Dijk Westlake Reed Leskosky, this was precisely the charge presented by trustees for the design of the Nathan and Fannye Shafran Planetarium, an addition to the existing Natural History Museum in the firm's hometown of Cleveland. Owing to several unique factors, it also became the challenge.

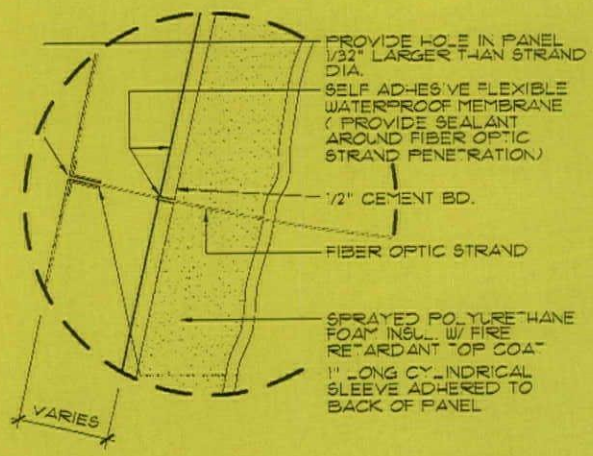
Located on Wade Oval, the Natural History Museum shares its neighborhood with the Cleveland Museum of Art, the Botanical Garden, the Cleveland Orchestra's Severance Hall, and most recently, Frank Gehry's Peter B. Lewis Building for Case Western Reserve University. Each has an impressive nighttime presence, and the trustees wanted the planetarium to communicate a message that could compete with these significant cultural structures. Unlike its neighbors, however, the new addition required a windowless exterior to protect the integrity of its exhibitions and projected presentations. The planetarium's outdoor lighting scheme also needed to defer to the observatory located at the museum; any spill light would interfere with stargazing.

Conceptualizing the planetarium's daytime demeanor also proved difficult; the best location for the building was at the entrance of the museum, which meant it had to welcome visitors and announce the institution's purpose—without actually being the ingress. Often, explains Paul Westlake, managing principal of the firm and lead architect on the planetarium, designers have light and glass or the interplay of glass and a solid material as the primary media with which to design a building's entry. "But a planetarium wants to be a windowless form that is circular in plan. Its most efficient shape—but not necessarily its most elegant—is probably a drum. We had to create a signature identity with forms that were solid and that had the potential to be awkward if not carefully sculpted."

DAY WEAR

The planetarium required "two different jackets," says Westlake. "The structure needed a presence by day and a presence by night." The "jackets" the design team chose speak directly to a separate-but-equal approach to materials and light, to a respect for both as distinct parts of a whole.

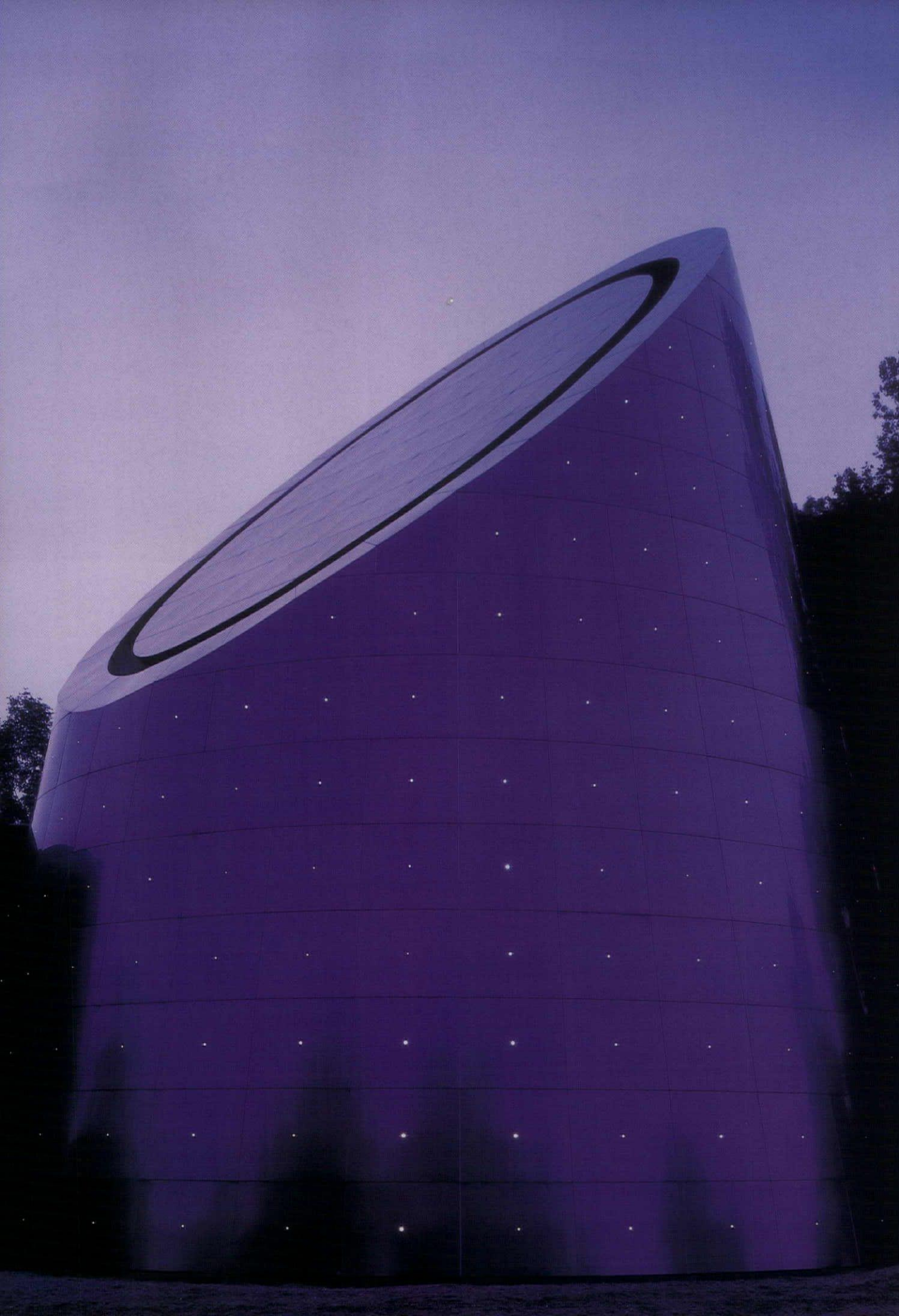
During the day, the planetarium's glinting bronze-colored façade primes visitors for the tale it will tell inside. Soft and workable, bronze and brass were used in the early days of astronomy, long before steel and aluminum (think Copernicus and Galileo), to create the instruments of planetary science, such as telescopes and sextons. Westlake admired the antique instruments machined from these alloys in the museum's collection and wanted to create a similar effect architecturally. There was one problem, however: copper-based alloys oxidize, acquiring a verdigris patina. After months of materials research, the team finally specified a titanium sputtered stainless-steel product from Japan. The titanium (which is inert and will not change color) is ionized; an opposite charge is applied to it and the stainless steel; and



FIBER OPTIC DETAIL

3"=1'-0"

At night, the new planetarium at the Cleveland Natural History Museum (facing page) twinkles with little fiber optic stars. Its daytime form—which is defined by a bronze-colored metal skin—is exchanged for a shape defined by dots of light. To achieve this effect, the designers threaded fiber optic strands through titanium sputtered stainless-steel panels (detail right).



A 50-foot corridor (above right) delivers visitors from the museum's entry lobby into the planetarium's exhibition space (above left). The hexagonal passageway is its own cosmic experience, with a programmed auditory element and pulsing fiber optic strands of light that seem to "float." Almost no daylight enters the interior (fenestration was avoided to preserve the integrity of the exhibits), but a glass reveal between the exhibit hall and conical planetarium allows about 5 percent light transmission, enough to communicate the addition's "day jacket" to visitors—a bronze-colored titanium sputtered stainless-steel façade (facing page). At night, the planetarium wears only geometrically arranged points of fiber optic light.

the two are fused together in a vacuum. A customized color simulating bronze was added to the material.

The architecture's deference to the instruments and program it houses does not stop there. Oriented to the North Star and designed with a chamfered roof, the planetarium is an astronomical tool in itself. The long axis of its ellipses is arrayed to polar north and the roof is angled to Cleveland's latitude (42.5 degrees), enabling a viewer with a sightline coplanar to the tilted roof to find the North Star.

AFTER HOURS

At night, however, the luminous bronze form—which seems "to hold sunlight"—disappears. There are no windows to define the building, and given its reflective skin, floodlighting the planetarium would have washed out the façade surface, as well as interfered with the nearby observatory. The building required a delicate treatment that both highlighted its distinctive form and respected the night sky.

"We had the idea of a 'sequined' jacket,'" says Westlake, whose firm also designed the lighting for the project. "It would be a form articulated only by dots of light": in essence, little electric stars. The designers considered a fiber optic system immediately, primarily for its energy efficiency and straightforward maintenance: There are six illuminators—all easily accessible by the maintenance staff for relamping—that power the façade's more than 400 points of light. Each illuminator contains a single 150W metal halide lamp, which was specified for its long life, further simplifying upkeep of the system. Choosing the right fiber optic strand proved more complicated. The light points on the metal skin were not to be any brighter than the brightest star in the sky, so the design team arranged several mock-ups during the fall months when the stars are most visible because of the limited moisture in the atmosphere. "We were amazed at how intense the fiber was; it hardly took anything to be visible from a quarter of a mile," Westlake recalls. Ultimately, they settled on a small 1/8-inch-diameter strand, eliminated end caps because of their bulbous effect, and fitted the illuminators with perforated wheels to filter out a bit more of the emitted light. The effect: geometrically arranged pinpoints of light that seem to gesture toward the sky and their more chaotically dispersed brethren.

Inside, fiber optics also outline the 50-foot passageway that connects the museum entry to the new planetarium and its exhibit hall, enticing and acclimating visitors as they approach. The designers wove approximately 50 fiber strands together—in a random configuration that suggests "calculated chaos"—along the ceiling and sides of the hexagonal corridor (a shape taken from the primary donor's favorite sci-fi movie, "Forbidden Planet"). The strands are encased between a perforated metal scrim and black-painted walls, and woven at different depths through the perforated fins that hold the scrim in place, creating an illusion of infinite space

interrupted only by light since the planes of the wall and scrim are not discernable. To raise the light level slightly, a dozen strands running along the ceiling were sheered off and inserted through the metal scrim for downlighting. In addition to an auditory element, visitors experience subtle shifts in the brightness of the fiber optic threads and the light points on the floor; the strands are randomly attached to five DMX-controlled illuminators fitted with filters that slowly change the amount of light emitted from the source. Westlake notes, "The corridor feels like it's pulsing."

The passageway—defined almost entirely by the fiber optic strands that stretch its length—draws on the lighting expression of the façade. (The bronze-colored metal skin with its fiber optic pinpoints briefly appears inside, where the conical planetarium connects to the exhibit hall.) The exterior, however, represents much more of a give and take between materials and lighting: "During the day, it is a solid object, with no sense of light," says Westlake. "You don't see the fiber optics at all. It's as if the thing were machined out of poured bronze. At night, however, you have absolutely no sense of the bronze metal; you only read the shape of the object by the light—sort of in the same way the constellations are read." For the planetarium, façade material and lighting are each inherently dependent on, and yet distinctly separate from, the other, like an architectural Dr. Jekyll and Mr. Hyde; when one is present, the other is absent, and yet it is the characters' coexistence that forms the whole. **EMILIE W. SOMMERHOFF**

DETAILS

PROJECT Nathan and Fannye Shafran Planetarium, Cleveland Natural History Museum

ARCHITECT van Dijk Westlake Reed Leskosky, Cleveland

STRUCTURAL / ME ENGINEER van Dijk Westlake Reed Leskosky

CONSTRUCTION MANAGER Gilbane Building Company, Cleveland

METAL SKIN CONSULTANT A. Zahner Company, Kansas City, MO

PHOTOGRAPHER Hedrich Blessing/Nick Merrick

COST $6.9 million

MANUFACTURERS	APPLICATION
Super Vision International	Fiber optics on exterior facade
Lumenyte	Fiber optics in corridor, DMX controller
Cooper Lighting	Exhibit hall lighting
Concealite	Self-controlled recessed emergency lights

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Daylight, Dimming, Design: The New Trends?

ACCORDING TO A SURVEY CONDUCTED LAST SEPTEMBER, 72 PERCENT OF ARCHITECTURAL LIGHTING MAGAZINE'S READERS DESIGN lighting for office space—the most predominant project type, followed by residential at 60 percent and retail at 57 percent. And if the economy actually expands, the square feet in this category should too.

Energy efficiency remains a major factor affecting office lighting design. Code requirements that limit wattage per square foot are inching across the country, and by 2005, should be in effect in most states. Meanwhile, the US Green Buildings Council's LEED rating system—intended to encourage sustainable building practices—is quickly becoming a dictatorial force in many new construction and major renovation projects. LEED certification programs for existing buildings, commercial interiors, and core and shell projects are also in various stages of pilot testing.

DAYLIGHTING Daylighting appears to have supplanted T8 and T5 lamps and energy-efficient ballasts as the hot trend in office lighting. If Lightfair International is a yardstick for what is happening in the lighting industry, the show's newly established Daylighting Institute provides a case in point. (See Industry Report, page 17.) Recently introduced products like Lutron Electronics' Grafik 7000 is another. The technology manages dimming, switching, draperies and shades, as well as monitors energy usage, from a centralized lighting control system. "Our clients are very interested in ways to effectively integrate window treatments with electric light control," says David Bennett, commercial marketing leader with Lutron. "There is an opportunity to create a high-quality visual environment, while meeting energy ratings, not only for watts per square foot, but also HVAC levels." In the next five years, he expects to see a growing demand for increased interoperability of control systems—integrating not just electric light and daylighting, but security and other building systems, facility-wide.

PERSONAL DIMMING According to Bennett, there is also a push for lighting management capabilities at the individual level. "I see a very exciting interest in personal lighting controls," he says. In 2003, the first stage of a study conducted by the Light Right Institute (of which Lutron was a sponsor) demonstrated a connection between personal dimming control and employee productivity. (See October/November 2003, page 39.) The study is not finished, but the lighting industry is hoping the results will provide quantitative proof of the value of quality lighting; building owners and architects might be more willing to listen if there are supporting numbers. Still, many designers remain skeptical. They are not seeing and do not expect an overly loud call for this technology for one particular reason: Personal dimming equipment and installation are still an expensive undertaking and, hence, seen as a design frill. "There is an acceptance hurdle that we have not succeeded in overcoming," says lighting designer James Benya of Portland, Oregon. "Until it goes from luxury to necessity, personal dimming is not going to happen on a scale that makes our industry transform."

DESIGN Will lighting be the next weapon in the ongoing battle against vanilla office space? On this, the jury is out. Benya expects a surge in creativity in this area—both in terms of new products and design approaches. "There is a renaissance in furniture-integrated lighting and in task lighting," he says. "Rather than the same-old same-old, designers want fresh equipment and concepts." For others, however, creativity and superior design are hampered by the spreading implementation of watts-per-square-foot requirements. "Energy codes are not necessarily good at promoting quality lighting," says Illinois-based lighting consultant Mitchell Kohn, who has chaired the IES office lighting committee for 15 years. The committee writes the ANSI standards for office lighting. "If you want to include lighting for aesthetic reasons, you may not have the watts to do it." He also sees a dearth in product options: "How long have we had the T5 and how many good fixtures are there specifically designed for the T5? A handful."

The collective industry will ultimately rule on these trends at Lightfair International 2004. For the 72 percent of A|L's readership with an interest in office lighting, this will be a good place to gather data. **EMILIE W. SOMMERHOFF**

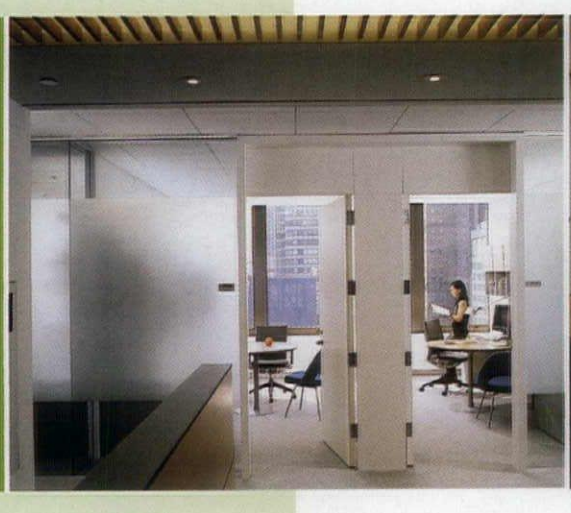
Absolute Vodka, New York City

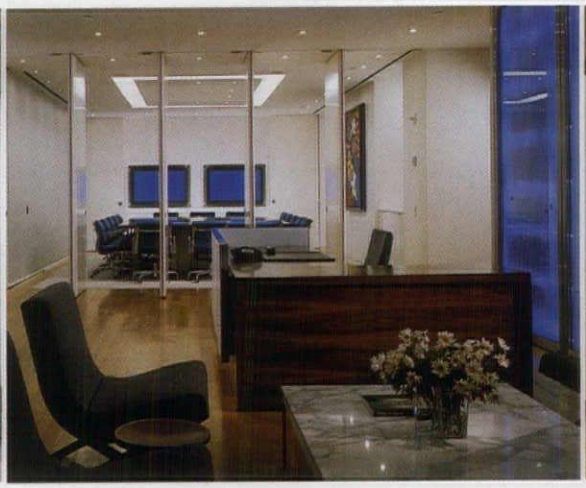
DETAILS
PROJECT | Absolute Vodka Offices, New York City
DESIGN TEAM | Gensler (architect); SBLD (Lighting Designer)
PHOTOGRAPHER | Nick Merrick, Hedrich Blessing
MANUFACTURERS | Boca Flasher, Celestial, Kurt Versen, LAM, Legion, Linear, Litelab, Neoray, RSA, Selux, and Zumtobel

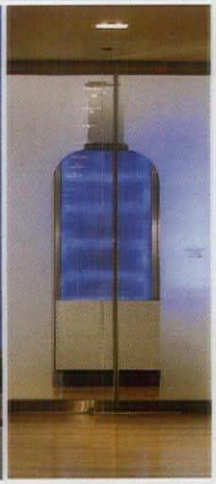
CHALLENGE Sweden's close proximity to the Arctic Circle creates an extreme lighting condition known as the midnight sun. Throughout June and July, Swedes experience almost 24 hours of daylight. So it was a particular challenge for interior architect Gensler and lighting consultant Susan Brady Lighting Design (SBLD) to incorporate this Nordic sensibility toward light into a typical New York City high-rise office space for its client, the Swedish company Absolute Vodka.

ARCHITECTURAL AND LIGHTING SOLUTION This generic 10,000-square-foot space is transformed through astute spatial planning, creative lighting techniques, and a palette of finishes that acknowledges Absolute's Scandinavian heritage and reinforces the blue tones of its branding campaign. The office is divided into a reception area, a conference room, a series of private and open offices, and support spaces. The client's request for natural light is achieved with consistent light levels from both natural and artificial light sources, giving the space an open, airy feeling. Lighting elements are integrated within the architecture, greeting visitors and employees immediately upon arrival. A pair of etched glass entry doors creates the silhouette of Absolute's trademark bottle. The backdrop of blue LEDs, from the reception area beyond, make it seem as if the bottle is "on ice."

An abundance of natural light and views of Central Park complement the main design feature of the reception area—a custom stainless-steel display case, innovatively illuminated with blue and white LED strips. The white LED strips are run vertically on the sides of each case, and horizontally edge the frosted glass shelves that display vodka bottles. Since a column to the left prohibited the extension of this display, white LED strips were employed to simulate the appearance of shelf lines and the outline of vodka bottles. Blue LED strips act as fill, and the overall effect is a display awash in a flood of blue light.







Adjacent to the reception area and hidden behind a group of four pivoting panels sits the conference room equipped with state-of-the-art teleconferencing capabilities. Minimal fluorescent slots and low-voltage downlights provide the required task illumination. The lights are preset to a series of dimming levels that correspond to the room's different functions.

In the open-office area, the defining feature is a suspended wooden-slat ceiling with a compact-fluorescent triangular light cove and a series of track lights concealed above. The result is a soft diffuse light, which filters through the openings. The use of wood throughout the project and especially on the ceiling helps to warm up the existing light color temperature. The walls of the perimeter offices facing the open area are frosted glass panels, so that even when the doors are closed, the interior open-office space still seems as if it were being flooded with daylight. In the private offices, indirect pendants supplemented with cove lighting are discreetly integrated above the doors to reinforce this effect.

The project provides light for everyone, defining space with a combination of direct light and diffuse glow, without drawing attention to the light fixtures and sources. Wherever possible, access to daylight is provided; however, when a true daylight source could not be achieved, innovative use of materials in combination with artificial light gives the impression of daylight. The result is a calm and comfortable work environment that stays true to its Scandinavian roots. **ELIZABETH DONOFF**

Trauma Treatment Center, San Francisco

CHALLENGE For the newly established Trauma Recovery and Rape Treatment Center, a University of California San Francisco project, the acquisition of an old timber-frame industrial building in the city's Potrero Hill district offered 11,000 unobstructed square feet that could be used for open and private offices, consultation rooms and support spaces. Budget limitations for all aspects of the project—lighting, furniture and construction—were set in advance of the design process. For Luminae Souter Associates, the architectural lighting firm on the project, the biggest challenge was meeting a not-for-profit budget ($1.80 per square foot for the lighting treatment), while maintaining quality and performance.

ARCHITECTURAL AND LIGHTING SOLUTION The San Francisco architectural firm SMWM designed the new interior. To lower costs, the central office space incorporates walls but not ceilings. Since the roof's peak is 26 feet high, a primary challenge was to brighten the dark space between the roof and the offices below. The ceiling was painted white and three small skylights were set along the ridge where exhaust fans had been removed. Indirect fluorescent fixtures placed above the perimeter walls uplight the ceiling and minimize the contrast between electric light sources and natural light from the skylights.

Sandblasted glass wall sconces with compact fluorescents provide general lighting throughout the central space and reception area, as well as in areas with low ceilings where pipes, ducts and other obstacles restricted the use of recessed lighting. The wall sconces add sparkle to the corridors, while a warm color temperature helps to calm patients. (Although most residential lighting is in the 2800K range, Luminae Souter selected 3000K fluorescent lamps because the color temperature suited an office environment but maintained a residential feel.) To avoid purchasing new fixtures for private offices, the existing indirect pendant fluorescent fixtures were removed, cleaned and lamped with recyclable T8 lamps. A track system with low-voltage MR16 halogen lamps lights art works and bookshelves in the open-office area. The lamps are cantilevered from a wall-mounted track and have an 11-1/2-inch curved stem for flexibility.

The most dramatic—even whimsical—fixtures are the "gull wing" pendants that hang over the work area to provide both task lighting and uplighting. Dubbed the "Jonathan Seagull" lights by the staff, one employee observed, "They add an element of fun to the space. The reflectors move sightly with the air and look like a flock of birds flying through the room."

Other than meeting California's Title 24 energy codes, there was no requirement to make this a "green" design. Nevertheless, the project's fluorescent lamps are energy-efficient and designed to fulfill the criteria for classification as non-toxic wasters established by the Federal Toxic Characteristic Leaching Procedure. The specified lamps have a lower mercury content and are completely recyclable.

The eight windowless consultation rooms are perhaps most representative of lighting's role in the healing process. Designed and furnished to suggest domestic sitting rooms, the spaces include a dimmer that allows users to control the lighting level of the sconces. Recessed downlights were avoided because of their institutional associations; instead the rooms have appropriate table or floor lamps. Here, and throughout, the lighting design works to ameliorate both a potentially stressful environment and a tight budget. **SALLY B. WOODBRIDGE**

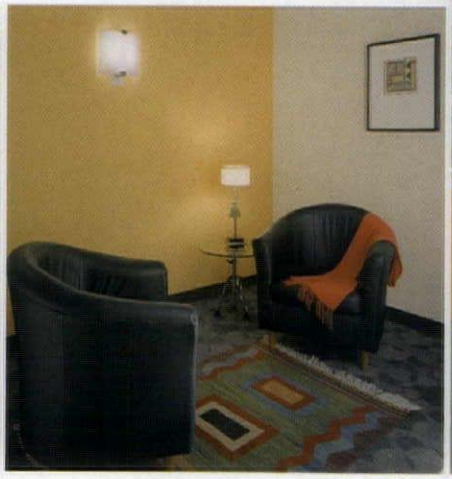
DETAILS

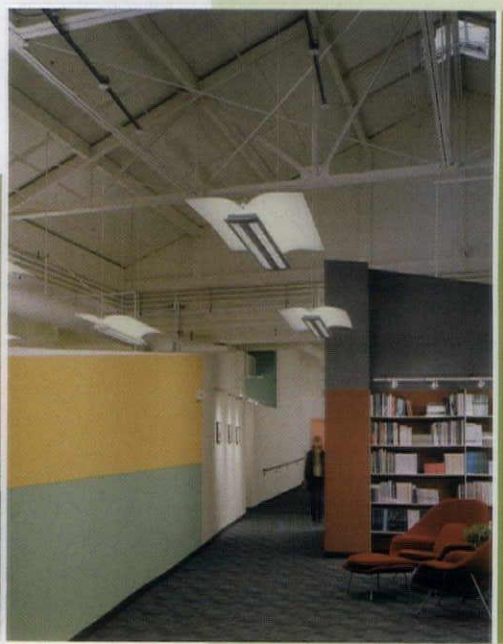
PROJECT | University of California Trauma Treatment Center, San Francisco

DESIGN TEAM | SMWM (architect); Luminae Souter (lighting designer)

PHOTOGRAPHER | Ron Starr

MANUFACTURERS | Axis, Corelite, Delray, Insight, Lightolier, Lutron, Prescolite, Tech Lighting, Winona





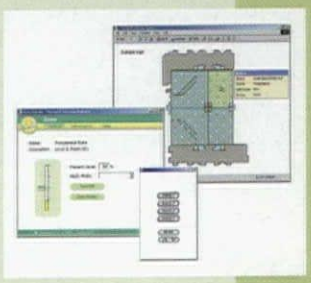
Product Review: At the Office

GAMMA LUCE | PRODUCT: LINEAR | SPACELIGHTING.COM
The Linear Collection offers versatility without sacrificing design. For use with T5HO lamps, the luminaire can be used as either an indirect or direct light source, and wall-mounted or ceiling suspended with cable or a fixed armature. Ranging in lengths from 33- to 82-inches, the fixture is an extruded aluminum structure in matt enameled aluminum with polished chrome details. An extruded polycarbonate opal shield protects the lamps. A dimmer option is also available. **CIRCLE 121**

CORELITE, COOPER LIGHTING | PRODUCT: NAVIGATOR SERIES | COOPERLIGHTNG.COM
Appropriate for open offices, laboratories and schools, the Navigator Series is a line of modular fluorescent luminaries: the 9-inch wide Navigator II, the petite 6-inch wide Minigator, and the Gator Wall Mount—with optical control features for complex direct-indirect applications. Each is available with three downlight-media options, Slide-n-Lock optics and Lamp-Isolators. All Navigator luminaries can accommodate T5 and T8 lamp sources and can be mounted individually (4-foot, 8-foot, or 12-foot lengths) or in a continuous row. **CIRCLE 122**

TRILUX | PRODUCT: ENTERIO | TRILUX.COM
Enterio provides efficient lighting where ceiling height is at a premium. An ultra-low-profile convex design with flush end caps allows it to function as a surface-mounted luminaire or semi-recessed with a depth of 3/4 inches in grid ceilings. These fixtures feature highly specular Darklight parabolic louvers designed specifically for T5 fluorescent lamps. The innovative louver design and advanced optical technology offers high working efficiencies (over 80 percent). **CIRCLE 123**

DAY-BRITE LIGHTING | PRODUCT: EPSILON LUMINAIRE | DAYBRITE.COM
A video display terminal (VDT) fixture designed around T5 lamps, Epsilon provides high efficiency and uniform brightness. The fixture has a 3-inch profile, yet still provides glare control and efficiency. The Micro 4 louvers offer high reflectance, while the perforated panels between louvers prevent the "black hole" appearance of traditional specular louvers. Maximum average brightness meets IESNA RP-1 standards for areas with VDTs. **CIRCLE 124**



LUTRON | PRODUCT: GRAFIK 7000 CENTRALIZED LIGHITNG CONTROL SYSTEM | LUTRON.COM
This system brings integration, control, and energy management advantages to any size project. It offers advanced hardware capabilities and customizable user interfaces for flexible and seamless integration of dimming, switching, motorized draperies and shades and daylighting. Building operations are streamlined with comprehensive energy monitoring and management features. Innovative floor-plan-based software and a graphic user interface provide central, local and personal control options with customizable access privileges. GRAFIK 7000 can meet the control requirements of any project—up to 16,000 lighting zones, 6,000 wall stations, and 2,000 power panels. **CIRCLE 125**

PRUDENTIAL LIGHTNG | PRODUCT: SUPER COVE | PRUDENTIALLIGHTING.COM
The Super Cove low-profile lighting system for T5HO or T8 lamps suits small office, conference room, and retail and lobby applications. Formed 95 percent reflective specular aluminum throws light at low angles. A galvanized-steel bottom reflector directs and diffuses light on the ceiling to eliminate striations while limiting uplight. A white backlight reflector fills the cove cavity with light, limiting socket shadows. Super Cove is available in a variety of lengths from 2 to 8 feet. **CIRCLE 126**

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Measuring Daylight

ELIZABETH DONOFF

PROJECT BACKGROUND

Twenty-one years after its completion, the High Museum in Atlanta has a new lease on life. Its collections and signature building, designed by Richard Meier, now happily cohabitate thanks to a renovation by Atlanta-based Lord, Aeck & Sargent (LAS), in conjunction with London-based Arup Lighting.

The museum's original home in the adjacent Memorial Arts Building had little daylight. "It was not a pleasant place for people to be," explains Marjorie Harvey, director of architectural planning and design for the High Museum. "When we started working with Richard Meier, we knew we wanted daylight in the galleries."

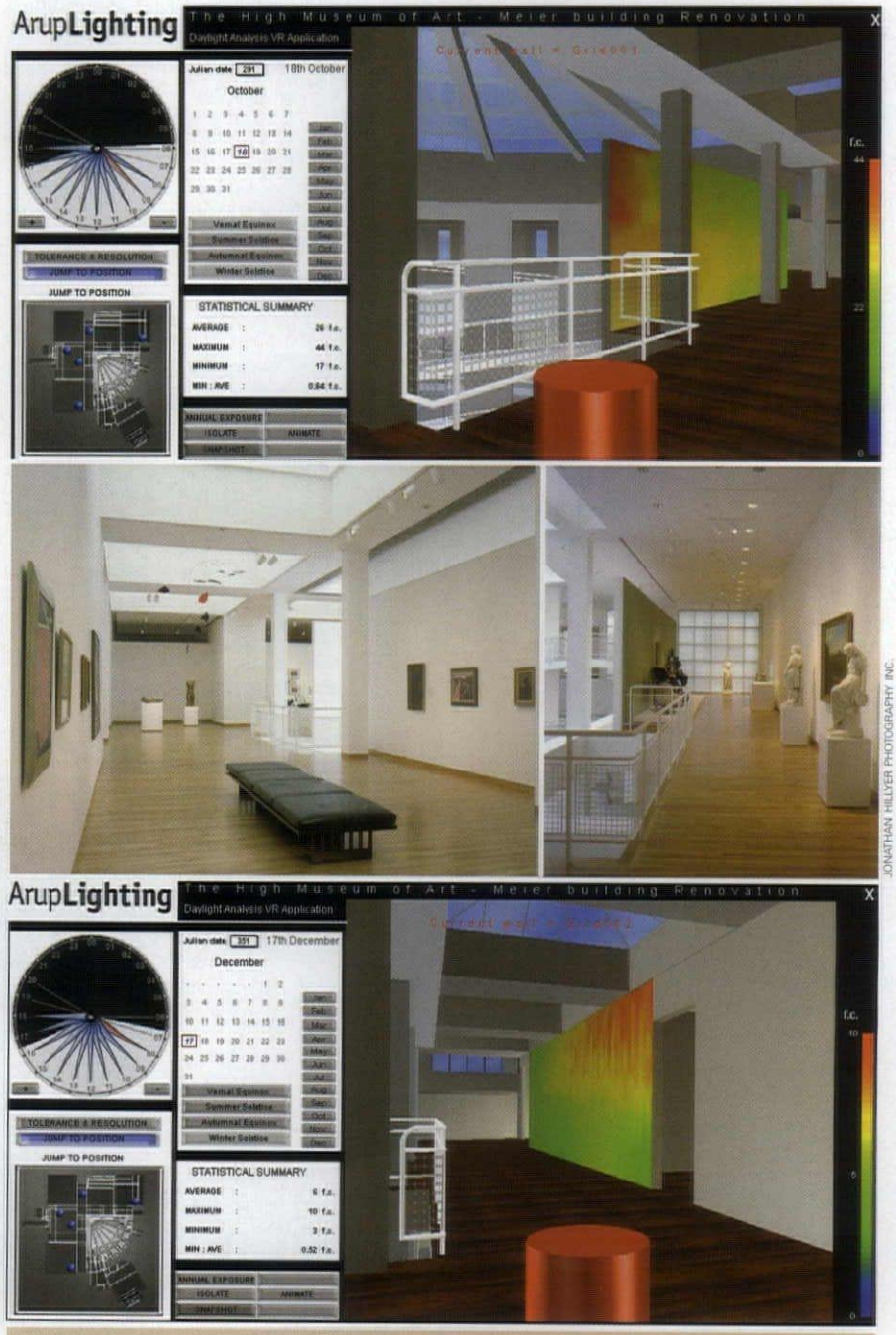
Ultimately, however, Meier's design brought too much light into the museum. Locations such as the fourth-floor galleries, were illuminated with an average of 1,000 footcandles, drastically exceeding the accepted practice of allowable light for a museum setting and artwork conservation, as outlined in the *IESNA Lighting Handbook*. According to the IES handbook, light-sensitive media such as watercolors should only receive 5 footcandles, and less sensitive media such as oil paintings should receive 20 footcandles

Over time, the museum, in order to exhibit its collection within the difficult lighting conditions, made several of its own alterations—closing over the fourth-floor gallery skylights, building walls in front of windows and installing brown mechoshade inserts in each atrium curtain-wall window module. "We were able to control the light, but we compromised the architecture," states Harvey.

FEASIBILITY STUDY / ANALYTICAL TOOLS

The museum's current expansion provided an opportunity to renovate the Meier building in order to bring the daylight under control while maintaining Meier's original design intent. In order to evaluate the scope of work that such a renovation would entail, the museum hired Arup Lighting to prepare a feasibility study.

Arup conducted an extensive field survey of existing conditions and light strike areas. Using a program called Radiance, developed by Lawrence Berkley Labs in California, Arup was able to model to the exact year, day and minute the sun's travel path at any spot in the building. The museum, out of necessity, had actually created its own document—a sort of flip chart of transparencies that noted the day and time of light strikes, with a different color for every month. The worst scenario was in June and July, when the diagonal wall on the third floor received an extreme



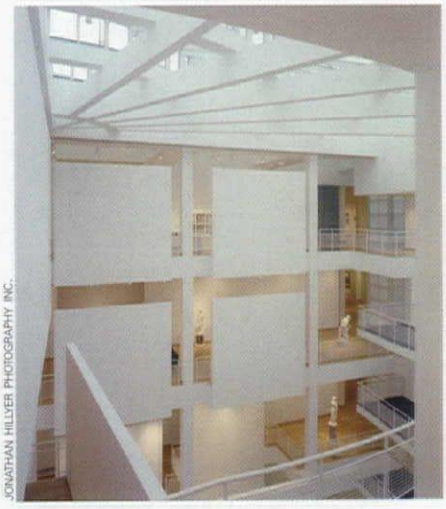
JONATHAN HILLYER PHOTOGRAPHY INC.

Sun location and travel path in the balcony galleries (top) and fourth-floor galleries (bottom) are modeled using Daylight Analysis VR Application software, a program currently in development by Arup Lighting. The finished galleries (center left and right) create a harmonious environment for art and light.

light strike lasting for 20 minutes. This flip chart dictated where certain artwork could and could not be displayed, and made, from a curatorial point of view, very user-unfriendly galleries.

CORRECTIVE MEASURES

The challenge was to reduce natural light and prevent UV transmission, glare and light strikes within the balcony and adjacent galleries, while adhering to the stringent footcandle requirements. LAS and Arup looked at passive and active technologies, including static blinds and moving parts internal and external to the building, and prismatic glazing on louvers.



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A view across the atrium reveals the combination of natural and artificial light sources.

To control ultraviolet light, the renovation called for window films on the different glass surfaces throughout the building—the glass block, gallery skylights, and atrium skylight and curtain wall. The glass block surfaces use a film that allows 20 percent light transmission; the pyramid-shaped skylight employ a film that permits only 4 percent light transmission; and the atrium curtain wall uses the most transparent film, allowing 70 percent light transmission. In conjunction with the films, white static shades, fixed at top and bottom, shield each window module. The combination of the film and shades reduces the quantity and penetration of light and instead creates a diffused daylight.

LAS and Arup were aware of the aesthetic implication of applying a series of films to these highly visible glass surfaces, and architect and lighting consultant devised a series of mock-ups to test different films. Darker films were found to be too reflective and visually apparent. The final selection was a series of products from UK-based SUN-X.

The technical and design solutions for the High Museum have exceeded expectations. Arup's visit report in October 2003 noted that "in all the galleries a UV proportion of less than 10 microwatts per lumen is achieved, and complies with the most stringent UV transmission criteria." From the beginning of the renovation process, the focus for LAS, Arup and the museum was to preserve the intent of the building while not sacrificing the collection. LAS and Arup worked closely with the museum controlling architectural elements, creating places for the display of certain kinds of artwork, as well as visitor comfort issues. "People are attracted to light, art and architecture," says Harvey. Now the High Museum accomplishes that in a daylighting tour de force. ■

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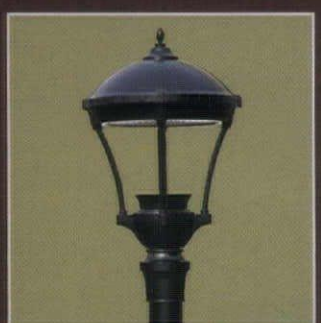

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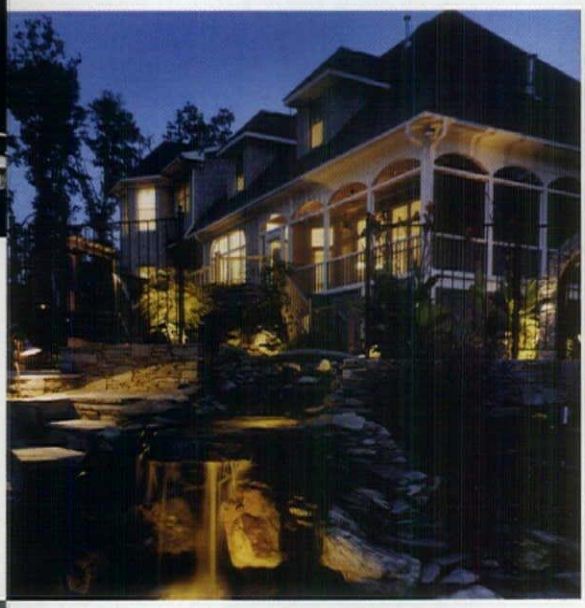

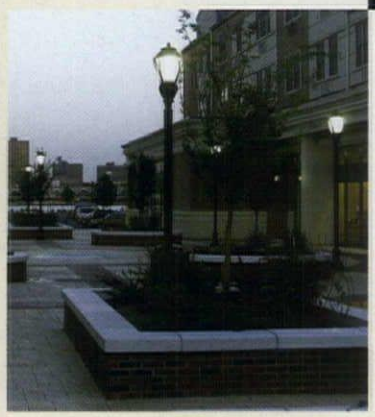

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Up Ahead: Hybrid Lighting

JEFF MUHS

An emerging technology confronts conventional wisdom on daylighting design.

LIGHTING DESIGNERS AND ARCHITECTS HAVE LONG toiled over problems of glare, variability, heat gain, and architectural design and maintenance issues associated with various topside daylighting approaches. A research effort led by the Oak Ridge National Laboratory (ORNL) in Oak Ridge, Tennessee, may soon make the job a little easier. Analogous to hybrid electric vehicles that use both batteries and internal combustion engines to power cars, hybrid lighting employs roof-mounted collectors to concentrate sunlight into flexible optical fibers and carry it inside buildings to "hybrid" light fixtures that also contain electric lamps. As the two light sources work in tandem, control systems keep lighting levels constant by dimming the electric lights when sunlight is bright, and turning them up as the sky darkens with weather conditions or nightfall. Hybrid lighting is more energy efficient than traditional electric lighting systems and provides designers with unprecedented design flexibility and control over where and how sunlight is used inside a building.

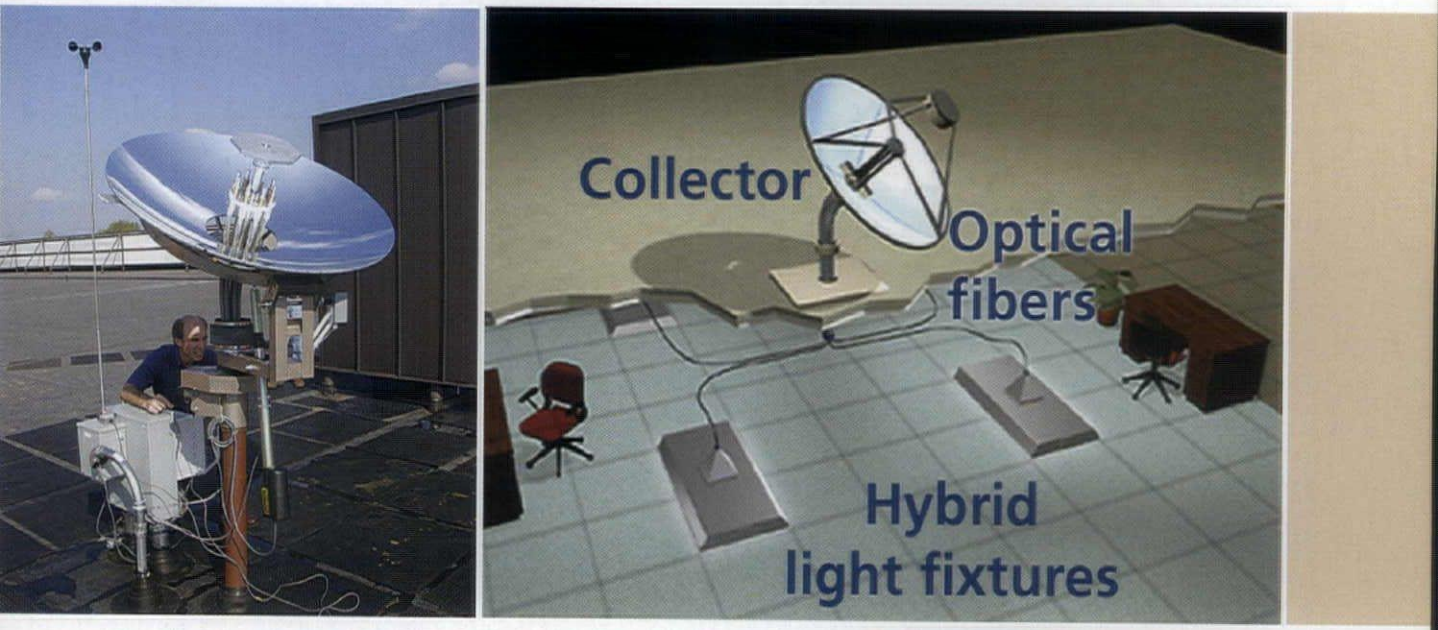
A BRIEF HISTORY

In the early 1980s, researchers in Japan developed a precursor to hybrid lighting systems. However, at the time, tracking the sun accurately was difficult, expensive and unreliable. Light distribution losses in polymer optical fibers were high, and different portions of sunlight were attenuated more than others, making emerging light look different from natural sunlight. And on cloudy days and at night, there was no way to automatically adjust electric lights. Recent advances in microprocessors and control algorithms have made tracking the sun a relatively easy, inexpensive and reliable task. Light losses in low-cost polymer optical fibers have dropped by a factor of three, and dimmable electronic ballasts capable of automatically adjusting several types of electric lamps are now commonplace. With this ongoing progress in its components, hybrid lighting is an increasingly realizable goal.

Indeed, the first hybrid lighting system was finally unveiled on October 7, 2003, after three years of development, during a day-and-a-half-long summit for designers and energy conservation advocates. (The system is being used in a commercial building in Knoxville, Tennessee, as part of an alpha prototype test.) Seventy-five participants witnessed a fully functional hybrid lighting system in operation, examined a second-generation collector, and discussed hybrid lighting in breakout sessions related to research and development needs, feedback from lighting designers and architects, and hybrid-lighting-based green energy marketing and incentive programs.

The current prototype incorporates a sunlight collector, which consists of a 1-meter-square parabolic primary mirror that tracks the sun throughout the day. A segmented secondary mirror reflects the visible portion of the converging sunlight into eight large core (12.6 millimeters) optical fibers, while allowing the ultraviolet and infrared energy to pass out of the system.

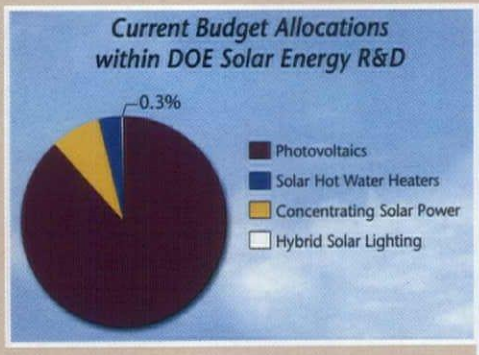
The collector is mounted on a 4-inch



Hybrid lighting uses natural sunlight and electric light, as hybrid vehicles use both batteries and internal combustion engines. Roof-mounted collectors (above left) capture sunlight with flexible optical fibers and carry it into the building to special fixtures that also contain electric lamps. A control system keeps lighting levels constant by dimming electric lights when sunlight is bright, and turning them up as the sky darkens.

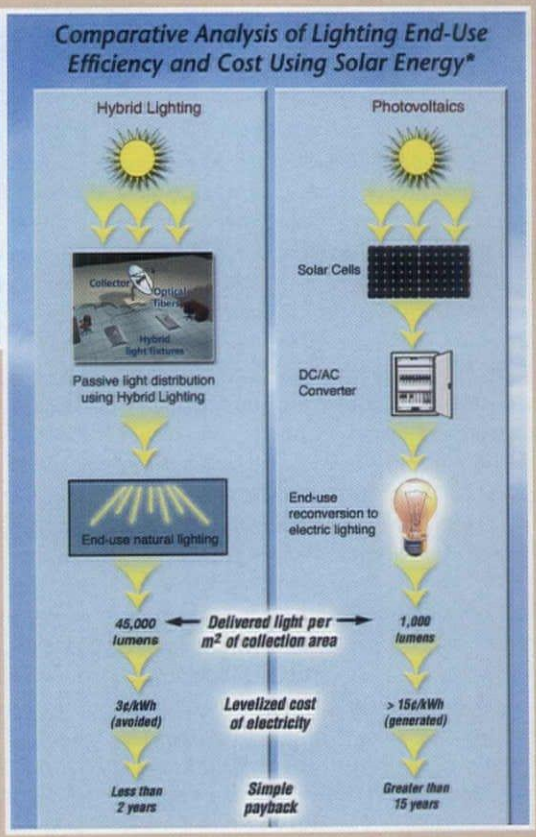
Using Sunlight to Save Energy: Where is the R&D money going? GLENN JOHNSON

Few people outside of the lighting industry realize that electric lights in commercial buildings consume 10 percent of the electricity used in the United States each year. Gathering sunlight directly requires no energy conversions, and is thus, inherently more efficient than other uses of solar energy. You might expect that a proportional amount of the Department of Energy's solar energy research and development budget would be spent on investigating new daylighting strategies like hybrid lighting. Unfortunately, they garner less than 0.3 percent of the fiscal year 2004 budget (see figure above). Why?



A quarter century ago, federal officials separated daylighting research and other solar energy research and development into two different programs funded by different congressional committees. Daylight was designated an "efficiency/conservation" technology, and other uses of solar energy (primarily photovoltaics) were designated "renewable supply" technologies. While most daylighting research money was lost in the shuffle over the years, billions of dollars have been spent on photovoltaics. When compared directly, Oak Ridge National Laboratory studies suggest hybrid lighting will be more efficient and affordable than photovoltaics when fully commercialized (see figure right). Sadly, until advocates for innovative daylighting research speak out, a more equitable distribution of research funds is not likely to occur.

Glenn Johnson, LC, is a member of the IESNA and has served the society for the past two years as president of the Tennessee Valley Section.



Comparison based on cost estimates in initial HSL target market (general illumination of single-story retail building in Sunbelt using halogen/incandescent electric lamps).

pipe, through which the eight fibers are routed into the building. The amount of light transmitted through each fiber is in the range of 5,000 to 6,000 lumens during sunny periods. According to lab measurements, distributed sunlight is virtually indistinguishable from direct sunlight in terms of color temperature, color rendering index and spectral power distribution. In the initial prototype shown last October, light was routed to eight separate luminaires that are traditional 2-foot-by-4-foot light fixtures containing four lamps each. The fixtures were modified to accommodate 3M side-emitting acrylic diffusers located between the fluorescent lamps, which spatially distribute the sunlight into the room below, as the fluorescent lamps located in the same fixture would. Other luminaire options are under development both at the lab and by manufacturers that will insure compatibility of hybrid lighting with sources including incandescent/halogen, LED and metal halide lamps.

As with any nascent technology, research is still necessary. The existing prototype is only about half the size of anticipated commercial units. By making the system larger, analyses predict more light can be collected and delivered at a lower overall cost per lumen. A larger commercial system is expected to illuminate, for example, about 1,000 square feet of floor space in a typical office building, compared to the 500 square feet the current prototype is capable of illuminating. Further, a second-generation collector and light distribution design is being tested that will allow for a more open "plug-and-play" design philosophy. In addition to being simpler to install, align and calibrate, it uses a new type of fiber optic bundle that reduces attenuation and color shift, while improving the flexibility of the fiber optic light distribution system. The redesign, which should be ready late summer 2004, is expected to produce a stand-alone hybrid lighting system that can be integrated with several different electric lamps of differing lumen outputs and used in a variety of applications.

ARGUMENTS FOR APPLICATION

Experiments show hybrid lighting is a viable option for lighting on the top two floors of most small commercial buildings. Even this early capability—sure to improve rapidly in the coming decade—is applicable to roughly two-thirds of the commercial floor space in the United States, meaning this technology has immense potential for impact.

For architects, lighting designers and building owners interested in incorporating

(CONTINUED ON PAGE 54)

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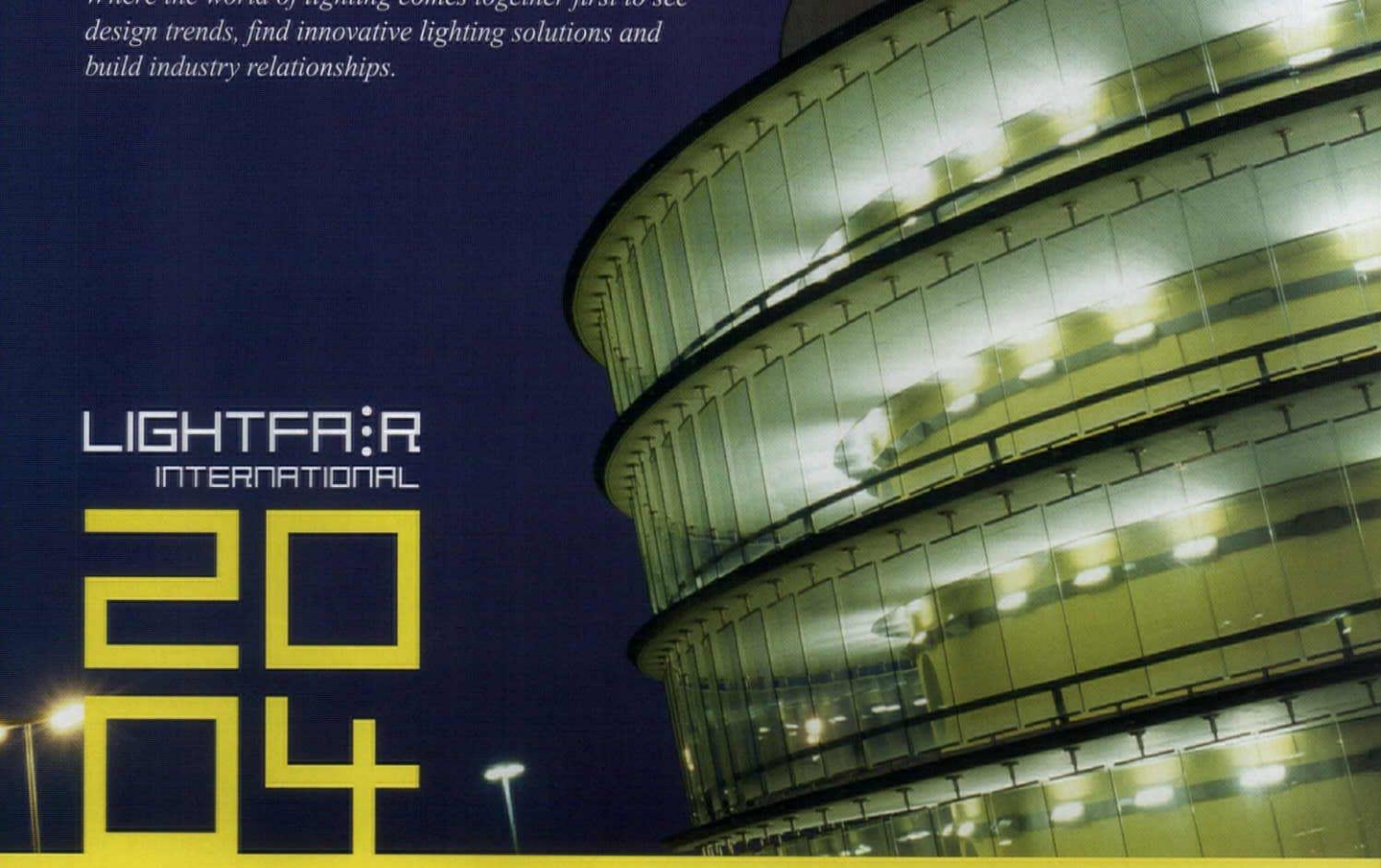

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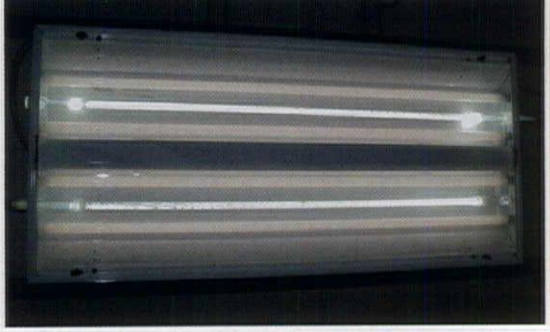

In the initial prototype, light is routed to eight separate luminaires that are traditional 2-foot-by-4-foot light fixtures containing four lamps each. Side-emitting acrylic diffusers located between the lamps distribute sunlight in the same way the lamps distribute electric light.

natural light into their building designs, hybrid lighting presents many reasons for specification. Unlike daylighting systems such as roof monitors, this system does not restrict site orientation; and unlike skylight designs, roof penetrations are few and small, reducing winter heat loss, summer heat gain and the potential for leaks. Hybrid lighting is better adapted to buildings with relatively low ceilings and many interior walls. As ceiling heights decrease, more and smaller skylights are needed to evenly illuminate interior spaces. Likewise, walls block daylight, so at least one skylight and typically more are needed per room. In hybrid lighting systems, optical fibers route sunlight horizontally above walls to various rooms so one hybrid lighting system, with an associated 4-inch-roof penetration, can illuminate several offices simultaneously; and unlike skylights, fibers can be routed through walls to floors below.

Hybrid lighting systems are also more easily integrated with daylight harvesting control systems compared to other daylighting strategies. With windows, non-diffuse skylights and roof monitors, the changing location of sunlight during the day makes commissioning of daylight harvesting systems difficult. In hybrid lighting systems, sunlight and electric light emerge from the same fixture with the same distribution pattern regardless of sun position. The spatial constancy of the light emerging from hybrid luminaries takes much of the ambiguity out of positioning and calibrating photosensors used in daylight harvesting control systems.

The technology also means more flexible incorporation of full-spectrum sunlight: The light emerging from the optical fibers can be used for indirect lighting or downlighting applications, or tightly focused on a work surface in combination with small point-source lamps for task lighting. Skylights simply do not provide such flexibility. By moving the collector slightly "off-sun," distributed sunlight can be dimmed or shut off completely like electric lights, addressing occupant complaints about spatial variability, glare and over-illumination.

Hybrid lighting also provides occupants with a subtle link to the outdoor environment, a condition proven by studies to aid productivity: At dawn and dusk, the color of distributed sunlight changes slowly for about an hour to match the red and orange hues of sunrise

and sunset. Weather conditions have a similar effect, causing a very slight color shift in ambient lighting conditions as electric lights automatically compensate for clouds or bright sunlight. At the Energy Efficient Lighting Systems 2002 Symposium, daylighting consultant Lisa Heschong, pointed to the benefits of such variability: humans are naturally adapted to change, not uniformity, and variation in lighting is mentally stimulating. Moreover, she noted, our circadian rhythm controls alertness, mood and health. If variation is undesirable, however, inconsistent color temperatures can be controlled by fitting hybrid luminaires with electric lamps that closely match the color temperature of sunlight—a trend seen in big-box retail chains today. For example, Wal-Mart has retrofitted most of its more than 4,000 stores with 5100K electric lamps to match the natural light entering through skylights. The company says its stores appear more open and clean, and its products more appealing to customers under these lamps.

Certainly, hybrid lighting is not the only advanced daylighting solution that will be considered by designers of the future. In some buildings, other technologies such as light pipes and light wells may be more appropriate given the context of the architect or lighting consultant's overall design strategy. But research indicates a range of very viable and effective applications for this technology. Based on initial assessments by the Antares Group Engineers and Economists in Landover, Maryland, and the University of Wisconsin, Madison, as well as input from participants at the October 2003 summit, the first use of hybrid lighting is likely to be in high-end retail stores, where small, low-efficiency lamps are traditionally used to highlight products. Further, hybrid systems will likely be installed in the Sunbelt, where electricity prices during peak demand (typical store hours) are usually twice that of off-peak prices. In these markets, analyses project that once fully commercialized, hybrid lighting systems could have a payback period of under five years.

While research continues, alpha demonstrations are planned in Muscle Shoals, Alabama, and Sacramento, California, in the coming months. In both cases, lighting designers, architects and facilities managers will be invited to visit and provide feedback to system designers. To visit either installation or attend workshops being scheduled this fall at both locations, please contact Dave Dinse at the Tennessee Valley Authority Public Power Institute (423) 751-7410 or Cliff Murley at the Sacramento Municipal Utility District (916) 732-5118, respectively. ■

more information at
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Jeff Muhs is the director of solar energy research and development at the Oak Ridge National Laboratory (ORNL) in Oak Ridge, Tennessee, and leads ORNL's research on hybrid solar lighting technology. He is the author of numerous technical papers and 13 patents in the fields of optics and photonics. Muhs was named ORNL's "1997 Scientist/Engineer of the Year" and is active in many technical societies, including the IES.

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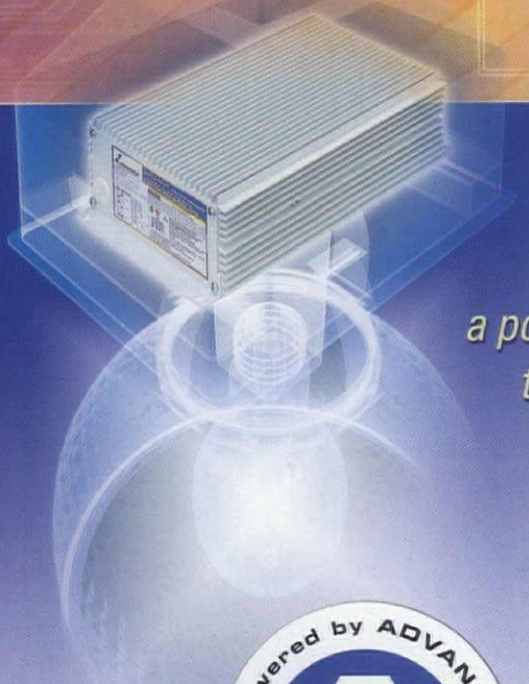

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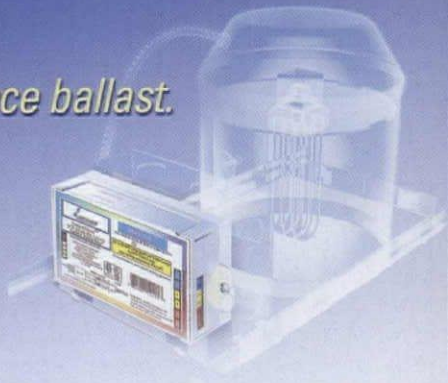

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The past five years have brought significant changes, says Pamela Horner, environmental marketing manager for Osram Sylvania's General Lighting Division. She has seen, for example, broad market acceptance for the T8 lamp, complete offerings of T5 and T5HO lamps from the major manufacturers, an increased number of self-ballasted compact fluorescents and a larger offering of halogen lamps with IR-reflective coatings. She has also seen significant growth in ceramic metal halide and pulse-start metal halide types and wattages, and believes ceramic metal halide will displace a number of quartz arc tube metal halide lamps over the next five years.

As is the nature of industrial progress, manufacturers continue to improve the system performance of familiar lamp types—particularly in the areas of service life, lumen maintenance, light output and efficacy. Other major trends include the continued drive towards energy efficiency and green design and the development of smaller light sources.

ENERGY EFFICIENCY On July 15, 2004, a U.S. Department of Energy (DOE) ruling takes effect as part of the National Energy Policy Act of 1992. Under the ruling, all states must certify that they have energy codes in place that are at least as stringent as model energy code ASHRAE/IES Standard 90.1-1999, or justify why they cannot comply. As of October 2003, 20 states are in the process of adopting energy codes that meet or exceed the requirements of Standard 90.1-1999; Kansas has adopted the 2001 standard. The standard's lighting requirements are stringent enough to essentially require the adoption of electronic-ballasted T8 systems for new construction and renovations. The foundation is already laid: Horner says that T8 lamp-ballast systems have become increasingly commonplace over the past five years.

"Energy-efficient T8s have become the norm in new construction, with an increasing number of Super T8s being used," says Horner. In the next five years, she believes, "T12 fluorescent lamps will be phased out for most general applications" in favor of T8s and other sources owing to energy concerns and new regulations.

The result is a growing family of T8 lamps. In addition to the Super T8 (instant start or programmed start), recent product introductions include 28W lamps (instant start or programmed start) and 30W lamps (instant start). New Super T8 lamp-ballast systems combine high-light-output T8 lamps with low-light-output ballasts to produce light output comparable to a standard T8 system for about 15 percent less wattage. The Super T8 is distinguishable for its high light output (3,100 to 3,200 lumens) and also high lumen maintenance (88 to 92 percent end-of-life lumens) and long service life. Super T8 lamps include the Philips "Advantage," Osram Sylvania "Xtreme" and GE "HL." (See figure 1 for a comparison of sample systems.)

GREEN DESIGN Paul Walitsky, manager of environmental affairs for Philips Lighting, sees sustainability as a major trend—"long life, low mercury, energy efficiency and sustainable manufacturing processes"—along with recycling practices. A recent survey by the National Electrical Manufacturers Association (NEMA) found that lamp manufacturers reduced the total amount of mercury used in fluorescent lamps from 27 tons in 1990 to about 9 tons today, a 67 percent decrease; and also reduced their average use of mercury in each 4-foot lamp to 8.3 milligrams, an 80 percent decrease from the average level of 41.6 milligrams per lamp in 1990. Nevertheless, says Walitsky,

Lamp/Ballast System	Initial Lumens	Ballast Factor	System Wattage	Light Output	Energy Consumption
(4) 4-ft. F 40T12 energy-saving lamps w/ (2) energy-efficient magnetic ballast	2,650	0.88	144W	100%	100%
(4) 4-ft. standard F32T8 lamps w/ (2) standard electronic ballasts	2,850	0.88	112W	108%	78%
(4) 4-ft. 30WT8 lamps w/ (2) low-power electronic ballasts (instant start)	2,900	0.75	96W	93%	67%
(4) 4-ft. 28WT8 lamps w/ (1) standard electronic ballast (instant start)	2,725	0.89	95W	104%	66%
(4) 4-ft. Super F32T8 lamps w/ (2) low-power electronic ballasts (instant start)	3,100	0.78	96W	96%	67%

Figure 1. This chart provides a sample of T8 lamp/ballast systems, with a F40T12/magnetic ballast system as a standard for comparison. (Developed from lamp literature with assistance from Advance Transformer.)

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Figure 2. Over the next decade, magnetic ballasts will virtually disappear owing to a Department of Energy ruling that goes into effect in 2005.

New Ballast Efficacy Standards	
July 1, 2005	Ballasts sold by manufacturers must meet new efficacy requirements.
April 1, 2006	Ballasts integrated into new lighting fixtures must meet new efficacy requirements.
July 10, 2010	Replacement ballasts must meet new efficacy requirements; until then, ballasts that do not comply can be manufactured for replacement use, limited to short leads and quantities of 10 or less, and marked "For replacement use only."

"the industry still uses nine tons of mercury per year. This amount must be reduced."

One year ago, NEMA announced that the members of its lamp section—which includes Philips Lighting, Osram Sylvania, GE Lighting, EYE Lighting, SLI Lighting, Ushio America and Venture Lighting—have adopted a nationwide program to label fluorescent and HID lamps that contain mercury, as well as their packaging. Each label now includes the international symbol for mercury, Hg; the notice, "Lamp contains mercury. Manage in accordance with disposal laws"; and a toll-free number and a website, www.lamprecycle.org, for more information on state-specific disposal regulations.

SMALLER IS BETTER Besides T5 and T5HO lamps and the continued evolution toward a common footprint for associated ballasts, LEDs in particular show significant promise as they evolve from indicators to illuminators. Horner believes that in the next five years, the efficacy of white LEDs "will increase significantly beyond today's 25 lumens per watt." She also points to the proliferation of low-wattage, small-diameter ceramic metal halide lamps.

BALLASTS

The electronic ballast overtook the magnetic ballast in unit sales volume for the first time in 2001, a remarkable achievement given that electronic ballasts comprised only 14 percent of volume in 1992. And electronics were barely on the radar, representing just 0.6 percent of volume, in 1986.

Over the next five to ten years, magnetic ballasts will virtually disappear from new construction and, in time, from existing buildings as well, thanks to a new DOE ruling initiated under the 1988 Federal Ballast Energy Law that goes into effect in 2005. It mandates new efficacy standards for ballasts used to operate F40T12 and F96T12 lamps (see figure 2). In most cases, only electronic ballasts will comply, although magnetic ballasts will still be manufactured for F96T12HO lamps rated for -20 degrees fahrenheit for all applications except outdoor signage. Exceptions to the rule also include residential ballasts that have a power factor less than 0.90 and ballasts dimmable to 50 percent or less. In addition, the 0 degrees fahrenheit starting exemption is removed. T8 lamps are not covered by the rule, as there are several applications for these sources, such as electronic-sensitive areas, where electronic ballasts would not be used.

The growing commoditization of the electronic ballast has encouraged manufacturers to continue to innovate and differentiate their products to add value. In general, electronic ballasts are getting smaller while offering greater versatility, controllability and capabilities. Several new trends in ballast development include:

ADOPTION OF PROGRAMMED START These rapid-start ballasts provide precise heating of the lamp filaments and control the pre-heat time before applying the start-up voltage, thereby reducing filament stress. The result is longer

lamp life and a solution for applications where frequent switching affects lamp life, such as spaces with occupancy sensors. They have been available for over a decade, but are now becoming popular as automatic switching strategies are increasingly specified for new construction. Expect even greater use of programmed-start ballasts with adoption of Standard 1999, since it mandates automatic switching controls in a broad range of applications.

DIGITAL BALLASTS The benefits of facility-wide dimming (flexibility, energy savings) combined with a personal dimming interface (greater employee satisfaction and performance, energy savings) have led to increased demand for digital lighting networks. The heart of these networks is the digital ballast. Market interest in facility-wide dimming has led to growing adoption of the Digital Addressable Lighting Interface (DALI) protocol by digital ballast manufacturers, as well as by a number of controls manufacturers. DALI provides a standard set of rules that govern the exchange of information across a computer network. If all ballasts and controls connected to the network are DALI-compatible, they are interoperable, providing the benefits of competitive bidding between manufacturers and helping to insure that the networked lighting system operates properly.

"Electronic ballast technology over the next five years will lead us down a digital path that will open new horizons for the industry," says Stuart Berjansky, product manager for Advance Transformer. "The future lends itself toward miniaturization with increased capabilities, and the digital path will enable this to happen. Additionally, our suppliers continuously develop components that are smaller, which obviously helps us meet our size reduction requirements."

LEDS The growing popularity of the LED light source has prompted major manufacturers such as Advance and Osram Sylvania to offer LED drivers, including dimming and color-mixing drivers. New products, such as the Xitanium series from Advance, are designed to operate LEDs from almost any manufacturer, an important step in standardization for this young illumination technology.

ADAPTABLE BALLASTS These ballasts can operate multiple quantities and wattages of lamps on multiple voltages. Benefits include the ability to simplify and consolidate inventory, to change existing fixtures to adapt to new space needs without changing the ballast, to add or remove lamps to adjust light levels, and to eliminate problems due to installation errors when fixtures and ballasts are wired to the incorrect line voltage.

"Today, we have ballast models that are multiple voltage, models that operate multiple lamps, models that operate multiple wattage lamps; in the future, these will be combined into a single set of models," says Howard Wolfman, senior manager of regulatory affairs for Osram Sylvania.

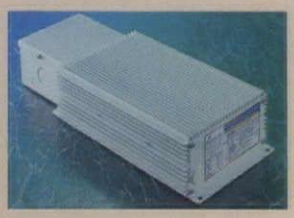
Other notable new ballasts include residential-qualified linear and compact fluorescent ballasts and four-lamp T8 high-ballast-factor (1.15) high-efficiency ballasts. ■

Craig DiLouie is principal of ZING Communications, a marketing communications and consulting firm specializing in the lighting and electrical industries. A former publisher of Architectural Lighting, *he is the author of many books and articles on lighting and electrical engineering.*

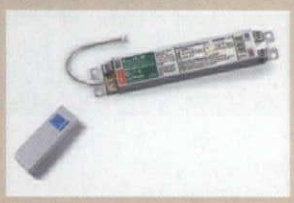
Lamps and Ballasts

SYLVANIA | PRODUCT: OCTRON | SYLVANIA.COM
Despite its equivilent size, the Octron 28W T8 lamp operates at 12 percent lower power than a standard 32W T8 lamp. The lamp is designed to provide light output of 2,725 initial lumens, rated life of 18,000 hours at three hours per start, and a lumen maintenance factor of 94 percent. CIRCLE 127

ADVANCE TRANSFORMER | PRODUCT: DYNAVISION | ADVANCETRANSFORMER.COM
DynaVision is a new line of microprocessor-based electronic ballasts for the operation of pulse-start metal halide lamps. DynaVision ballasts are energy efficient and provide superior lumen maintenance compared to magnetic ballasts. They also operate on different voltage systems, ranging from 200V to 277V; provide continuous 0-10V dimming, down to 50 percent of lamp power; and can operate either a 320W, 350W or 400W lamp. CIRCLE 128

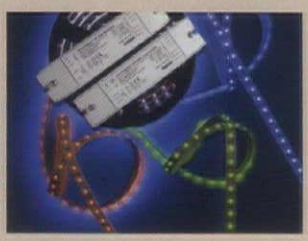


LUTRON | PRODUCT: ECO-10 IR | LUTRON.COM
Designed to simplify the installation of personal fixture controls in both new and retrofit situations, the Eco-10 IR is a fluorescent ballast with a built-in infrared dimmer. A handheld IR transmitter enables occupants to set lighting to individual comfort levels. It can also be installed for use with central control systems. CIRCLE 129



GE LIGHTING | PRODUCT: ULTRAMAX | GELIGHTING.COM
UltraMax is a line of electronic T8 ballasts that combine multi-voltage capabilities with high energy efficiency. According to GE, UltraMax-ballasted lighting systems can deliver energy savings up to 40 percent over standard-ballasted T12 systems. CIRCLE 130

OSRAM | PRODUCT: COLORMIX LED | SYLVANIA.COM
Colormix LED dimmable systems utilize a Colormix module for dynamic control of colored illumination; an OSRAM power supply with a range of input voltages; an electronically stabilized dimming component; and an optic lens that offers high optical efficiency and increased light intensity by reducing the viewing angle. These features enable the system to be used in a growing range of larger-scale applications. CIRCLE 131



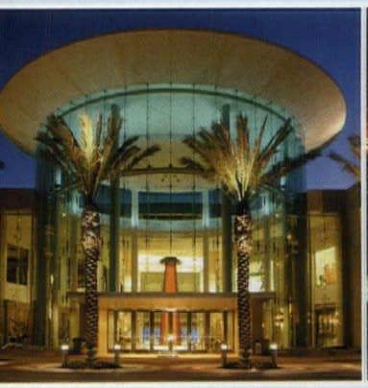
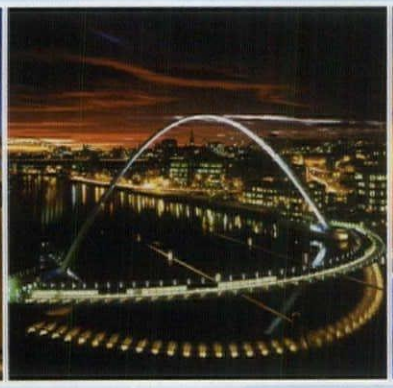
ADVANCE TRANSFORMER | PRODUCT: MARK 7 | ADVANCETRANSFORMER.COM
The Mark 7 0-10V electronic dimming ballast supports eight different compact fluorescent lamp-ballast combinations, including 13W and 18W applications, and is dimmable down to 3 percent. CIRCLE 132

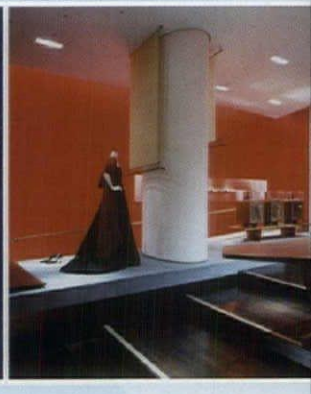
PHILIPS LIGHTING COMPANY | PRODUCT: MASTERCOLOR | PHILIPS.COM
The 320W MasterColor pulse-start lamp is designed to provide superior color performance and improved lumen maintenance compared to standard switch-start metal halide lamps. This ceramic metal halide lamp operates with a 90 CRI rating, 80 percent lumen maintenance and 15,000-hour rated life. CIRCLE 133

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

Architectural Lighting Master Classes

March 11-12, 2004



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Lithonia Lighting
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Lutron Electronics
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Ruud Lighting
SPI Lighting
Tech Lighting LLC
Visa Lighting
Winona
Zumtobel Staff Lighting Inc.

OTHER WINNERS

Architectural Area Lighting
Arroyo Craftsman
Bartco Lighting
Boyd Lighting Co.
Color Kinetics
Electronic Theatre Controls Inc.
Flos USA Inc.
Focal Point
Gardco Lighting
GE Lighting Systems Inc.
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Leucos USA
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Linear Lighting Corp.
Lucifer Lighting
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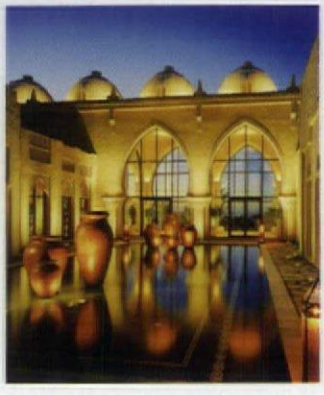

B-K Lighting

Industry Insight

"There is no single thing we do that results in our overall success. As always, we have to produce a quality product, provide excellent service levels, make it easy to do business with us, understand our customer's needs, respond, innovate, educate, add value, and do dozens of other things right just to be in the game. Fortunately, we do all of these things well," says Ron Naus, vice president of sales and marketing of B-K Lighting.

Since 1986, B-K Lighting has been dedicated to providing the lighting industry with the highest quality, most innovative, and fairly priced outdoor lighting fixtures available. B-K Lighting products have been featured in such prominent venues as The Seattle Opera House, Four Seasons Hotels, Disney World, Wild Animal Kingdom in Orlando, San Francisco's Embarcadero, and The Bellagio in Las Vegas. When product design durability are key design elements, residential and architectural installations demand B-K Lighting. B-K Lighting continues to strive for excellence in both design and quality, providing aluminum, brass, and stainless steel products to exacting standards. B-K Lighting's precision manufacturing ensures fixtures have quality and craftsmanship unequaled in the lighting industry.

This year, B-K Lighting introduced the award-winning IP-68 rated Tenaya® In-Grade Lighting Fixture, utilizing a wide selection of low voltage, halogen, compact fluorescent, metal halide, high-pressure sodium, and mercury vapor lamps with precision optics. Tenaya® features a Self-Renewing Air-Tight Lamp Module (S.E.A.L.™); patent-pending HydroLock™ Technology, which seals the wiring compartment and provides an anti-siphon device to protect the electrical components; a patent-pending leveling collar, which allows for field correction of low and out-of-level installations, as well as a patented Anti-Condensation Valve (ACV™). Tenaya® won Best in Category at this year's Lightfair in New York. "Innovation drives our business," said Ron Naus, vice president of sales and marketing for B-K Lighting. "From innovative products like our award-winning Tenaya® IP-68 In-Grade Lighting to opportunities from our customers to fabricate custom fixtures, much of what we do is at the forward edge of fixture design."

With many finishes, options, and accessories available, delivery times compare to the best in the industry. "In a time when outdoor manufacturers measure lead times in terms of weeks, we ship within days," says Naus. "Where most manufacturers offer a few color options, our standard palette extends to well over 200 choices." □

For more information: (559) 438-5800; www.bklighting.com

Photos: Quality, service, innovation, and value all add up to make B-K Lighting the number-one choice in outdoor architectural lighting.

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The industry agrees, judging Tenaya® Best of Category at this year's Lightfair in New York.

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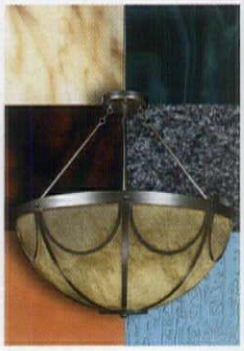
Acrilex

Acriglas custom acrylic sheets for lighting in faux finishes are designed to emulate the colors and textures of natural stone, patterned and frosted glass, mother of pearl and metal. Easy to fabricate and thermoform, this material is also specially formulated to withstand exterior conditions, UV exposure and impact.



CIRCLE NO. 130

Bartco Lighting

The high-quality, small-profile MiT5 and MiT8 fixtures are available in several single and double lamp configurations, which allow them to be used in a variety of indirect, backlight, utility and creative display applications. Both the MiT5 and MiT8 series include an electronic ballast and are available with optional dimming and emergency battery backup ballasts.

CIRCLE NO. 133

Architectural Area Lighting

The new Providence from AAL offers legendary lighting performance in a traditional form. Optical systems include full-cutoff vertical and horizontal reflectors, as well as a cutoff, indirect version for even, glare-free illumination. Available up to 175W, the Providence can be ordered with T6MH lamps, electronic and pulse- start ballast options.

CIRCLE NO. 131

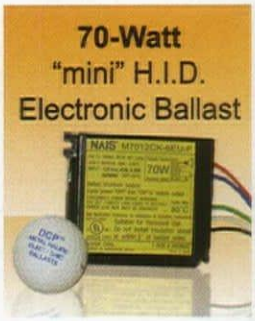
B-K Lighting

For floodlighting that absolutely must remain focused and in place after years of service, specify products with the Locking O-ring Compression Knuckle (LOCK™) by B-K Lighting. Using an internal taper lock and stainless-steel hardware, this mechanical compression fit is so strong, it holds position when subjected to the harshest of environmental conditions. For more information, a complete technical data sheet is available online at www.bklighting.com.

CIRCLE NO. 134

Aromat

Aromat adds a highly demanded 70W version to their "mini" electronic ballast line. This ballast is 50% smaller than the industry standard case and is available in Aromat's highly successful "mini-square" configuration. These small, light-weight ballasts run on a 120V power supply, provide up to 17% energy savings versus magnetic systems; and compared to halogen systems, deliver more lighting punch than a 250W lamp with an incredible 69% energy savings.



CIRCLE NO. 132

Con.Daz

Pelican by Con.Daz is an innovative indirect outdoor lighting system that provides a soft and glare-free illumination. This series features a fully adjustable reflector for total lighting control. Available with a wide range of light sources and constructed of durable materials. For more information contact us at (954) 717-4155, or visit us at www.condaz.com

CIRCLE NO. 135

Cooper Lighting

Part of the new meticulously detailed Invue line, the versatile Phocus architectural flood luminaire can be used for ground, wall, ceiling, burial and remote mounting configurations with its concealable size. Offering optical versatility with seven uniquely shaped distributions, plus an array of HID and quartz halogen PAR lamps, Phocus delivers a powerful performance. Light control accessories provide custom cutoff solutions.

CIRCLE NO. 136

Fad Lighting

Fluorescent tubes tend to have a negative image, and are associated with boring office lighting; Delta Lights BE COOL shatters this stereotype. Two round tubes create the extravagant look of the BE COOL. These stylish fixtures provide a maximum of light and are available in various pendant- and surface-mounted versions as detailed in the new Delta Lighting Bible Five literature

CIRCLE NO. 139

Delray Lighting

Delray expands the Spina line with a modular rail system. A beautifully finished matte anodized system that will connect all of our new Spina linear fluorescent T5 fixtures, as well as our new MR16 Spiro fixtures that can be pendant or adjustable stem mounted for task or spot lighting. The system has corner, T, X and vertical L connectors.

CIRCLE NO. 137

Hadco

Hadco's new slim design arm includes a 75W potted, electronic 12V transformer, retrofitting low-voltage accent fixtures in 120V applications. With an integral transformer, halogen lamps can be placed almost anywhere, with no voltage drop. The BT5016 (shown) is a 50W MR16 accent fixture, with a rotatable shroud and double. All material is die-cast, marine-grade aluminum with thermoset powder-coat finish.

CIRCLE NO. 140

Electrix

Electrix manufactures a wide range of performance cove systems to efficiently drive illumination across walls and ceilings. Our AX series was designed around T5 fluorescent lamp technology with an asymmetric extruded aluminum reflector that adjusts 35 degrees. This series has a compact fixture design of 3 inches high by 5 inches wide. Electrix also offers a complete line of field-curveable, linear and ramped covelighting products for architectural applications.

CIRCLE NO. 138

LEDtronics

StripLED, Connectable LED Modules that make light work of configuring lighting solutions for channel and reverse-channel lettering, signs, displays, under-the-counter and architectural applications. StripLEDs eliminate many of the shortcomings of neon or fluorescent lamps such as heat, broken tubes and ballast failures. Each StripLED module contains four super-bright, wide-angle (85∫) LEDtronics SpiderLEDs; one 3-inch double-ended connector harness for easy daisy-chain assembly; and a pre-applied strip of 3M, double-sided foam tape for "peel and stick" placement.

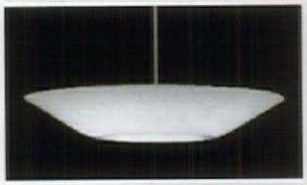
CIRCLE NO. 141

Leucos

Clean lines, architectural and large-scale, describe Leucos' new wall sconce, Todd, designed by Spanish architect Jorge Pensi. Layered white glass that features small horizontal ribbing is hand blown into a mold to form this 20" high by 9" wide (at top diffuser) sconce. Shadowless illumination is provided by a 36W compact fluorescent light source. Metal details are in polished chrome and this sconce seems to emerge from the wall with its clean mounting details. An excellent choice for lobbies, conference/meeting rooms and numerous applications, Todd is a perfect addition to the Leucos collection.

CIRCLE NO. 142

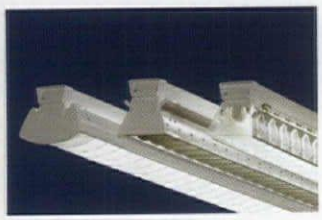
Metalumen Manufacturing



Make a Statement Invisibly – the Ring. With its clean contemporary design and superior luminaire functionality, it is ideally suited for a multitude of interior applications—from office to boardroom and beyond. The luminaire provides light distribution and subtle distinctions between light and dark and with its round shape, offers maximum flexibility to ceiling planning, eliminating the appearance of a suspended grid. For more information, go to www.metalumen.com.

CIRCLE NO. 145

Lightcontrol



A semi-direct extruded aluminum fixture representing the latest innovation in direct lighting distribution. SDx offers a small-scale housing with an elegant, grooved pattern and a choice of three unique baffle styles, providing up to 19% uplight. Lamping options include T8, T5 and T5HO. Baffle designs include a "radiant-edge style" with acrylic tinted blades; a "technical style" with parabolic baffles and narrow distribution; and a "retro style" with white blade baffles. Distinctive die-cast end caps match the baffle style of each fixture design.

CIRCLE NO. 143

Pathway

Pathway, the Lighting Source, announces Light-Squares™, a collection of square aperture recessed downlights. A precisely engineered reflector delivers high efficiency and uniform beam distribution with excellent visual comfort. A variety of specular and matte anodized Alzak finishes are available, as well as a textured corrugated style. For more information, contact 800-342-0592 or sales@pathwaylighting.com.

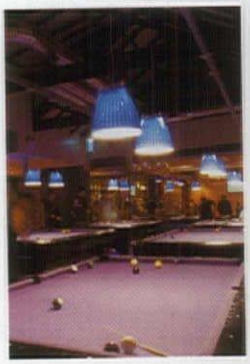
CIRCLE NO. 146

Lightolier

PowerArc Modular utilizes T4, T6, PAR, and ED17 ceramic metal halide lamps, wattages from 20 to 100W, beam spreads from 8 to 52 degrees, and unique construction that separates the lighting element up to 6 feet from the ballast and track itself. PowerArc Modular looks as good as it lights; and it lights superbly.

CIRCLE NO. 144

Prisma



The Opta pendant series from Prisma provides style and individuality to an interior space. The unique Italian-styled faceted glass is available in five standard colors; transparent, frosted white, cobalt blue, yellow (amber), and metallic gray. Custom colors are available to match your architectural design needs. With a variety of lamp sources and three sizes, versatility and choice defines Opta by Prisma.

CIRCLE NO. 147

Se'lux

Se'lux MTR systems provide an intriguing marriage of classic contemporary forms with the patented MTR refractor technology. MTR is a true prismatic refractor system with glare-free illumination, distributed precisely where it is needed. This product family includes bollard, wall-mounted, column forms and pole-mounted luminaires of die-cast and extruded aluminum.

CIRCLE NO. 148

Times Square Lighting

The 2016 energy-efficient MR16 fixture accommodates a wide variety of 12-volt MR16 lamps from 20W to 75W. The hinged front is easily opened for re-lamping and acts as a snoot, preventing spill and lamp glare. Glass filters, diffusion lenses, snoots and louvers are loaded within the fixture housing and held in place by a retainer ring, eliminating external clips. The 2016 can be ordered with a vertical or horizontal transformer housing. This housing can also accommodate an on/off switch or internal dimmer. For more information, please contact us at: (phone) 1-800-582-4258; (fax) 845-947-3047; www.tslight.com

CIRCLE NO. 151

Sentry Electric

Sentry Electric's SCT-Hartford luminaire is a unique blend of traditional and modern styling creating a luminaire that harmonizes with either classic or contemporary architecture. The SCT-Hartford was designed for use in illuminating the streets, plazas, walkways and public areas of a multi-use complex developed in the Hartford area adjacent to the Connecticut River. It features a glowing finial and an optional gold dome for added architectural distinction. Sentry Electric is one of the nation's leading makers of fine exterior luminaries, posts, bollards and accessories.

CIRCLE NO. 149

W.A.C. Lighting

Integrating function with style, the new Norfolk Series features a family of architecturally styled decorative fixtures designed to light modern commercial interiors. Pendants are available in two styles with diameters from 14" to 48" equipped with either incandescent or compact fluorescent lamps. Matching sconces, ceiling mounts and close-to-ceiling are part of the family, which is available with glass or acrylic diffusers and polished brass or brushed nickel metalwork. Typical applications include retail, hospitality, healthcare, facilities, and churches. Tel. 800.526.2588 or www.waclighting.com

CIRCLE NO. 152

Semper Fi

Semper Fi Power Supply manufactures UL-listed indoor and outdoor remote transformers that ensure no noise, no maintenance and full light output. Indoor units can be recessed into an insulated wall with up to eight transformers in an enclosure. Outdoor transformers include above-grade stainless or direct burial.

CIRCLE NO. 150

The Watt Stopper

The Watt Stopper's DT-300 360-degree Dual Technology occupancy sensors use both passive infrared and ultrasonic technologies to sense occupancy. The low-profile sensors feature patent-pending ultrasonic diffusers that offer an even distribution of the ultrasonic sensing signal, enabling effective detection of all levels of motion. In addition, SmartSet automatically adjusts time delay and sensitivity settings based on occupant patterns. Ideal applications include classrooms and open offices.

CIRCLE NO. 153

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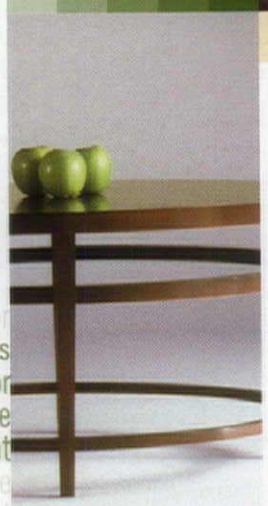

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Is the lighting industry facing "commoditization"?

It has been suggested that the lighting industry today has reached a state of "commoditization." Do you agree? If so, what should lighting professionals (manufacturers, designers, researchers) do to prevent this process, which often portends the downward spiral of an industry? (For additional discussion of this subject, see Industry Report, page 21.)


more commentary at
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PAUL GREGORY, PRINCIPAL DESIGNER | **FOCUS LIGHTING**

From the redevelopment of Times Square to significant buildings around the world like the Bilbao Guggenheim, lighting has become a key player in the world of architecture. Global demand for electric lighting equipment is forecast to increase approximately 5 percent per year through 2006 to $100 billion. This growth has caused a few conglomerate manufacturers to produce a wide variety of standard products and reduced the number of custom manufacturers. This change is an opportunity for the lighting designer, not an obstacle. There are so many more finished products now available; time can be spent on the design and concept of what the inside of a space will look and feel like. Designers no longer have to create the lighting fixture to do the job; they can utilize what's in the marketplace in new and exciting ways. There is also an increasing demand from consumers. People are more visually educated than they were 10 years ago. The patron of a restaurant has seen the Bellagio fountains; they've been to Disney World and London. The spaces we design are looked at with an increasingly discerning and critical eye. Consumers know what looks good and looks bad. Overall, this is good for the industry; it provides great challenge and excitement.

SUSAN HAKKARAINEN, PRESIDENT | **IVALO LIGHTING**

Lighting has not reached a stage of permanent commoditization. Every industry goes through cycles of reinvention. There are many different types of innovation—only one is "electronic/optical technology." Lighting manufacturers have made great improvements in the development of smaller and inexpensive electronic componentry and improved optics. It is time to address new areas, such as graphic user interface (GUI) and materials, alongside current research, so that everyone can experience quality lighting. If one defines GUI more broadly to mean how people interface with lighting, there are several specific areas where innovation could occur: Greater flexibility in products would help to allow for easier installation. Lighting descriptions need to be more user-friendly for those outside the industry; this will grow the market for manufacturers and for lighting designers. And products and their applications need to be easier to understand. Lastly, architects are investigating a number of advances in materials and manufacturing processes for use in building construction. If lighting can assimilate some of these advances, it will move into an area of interest to the architectural community.

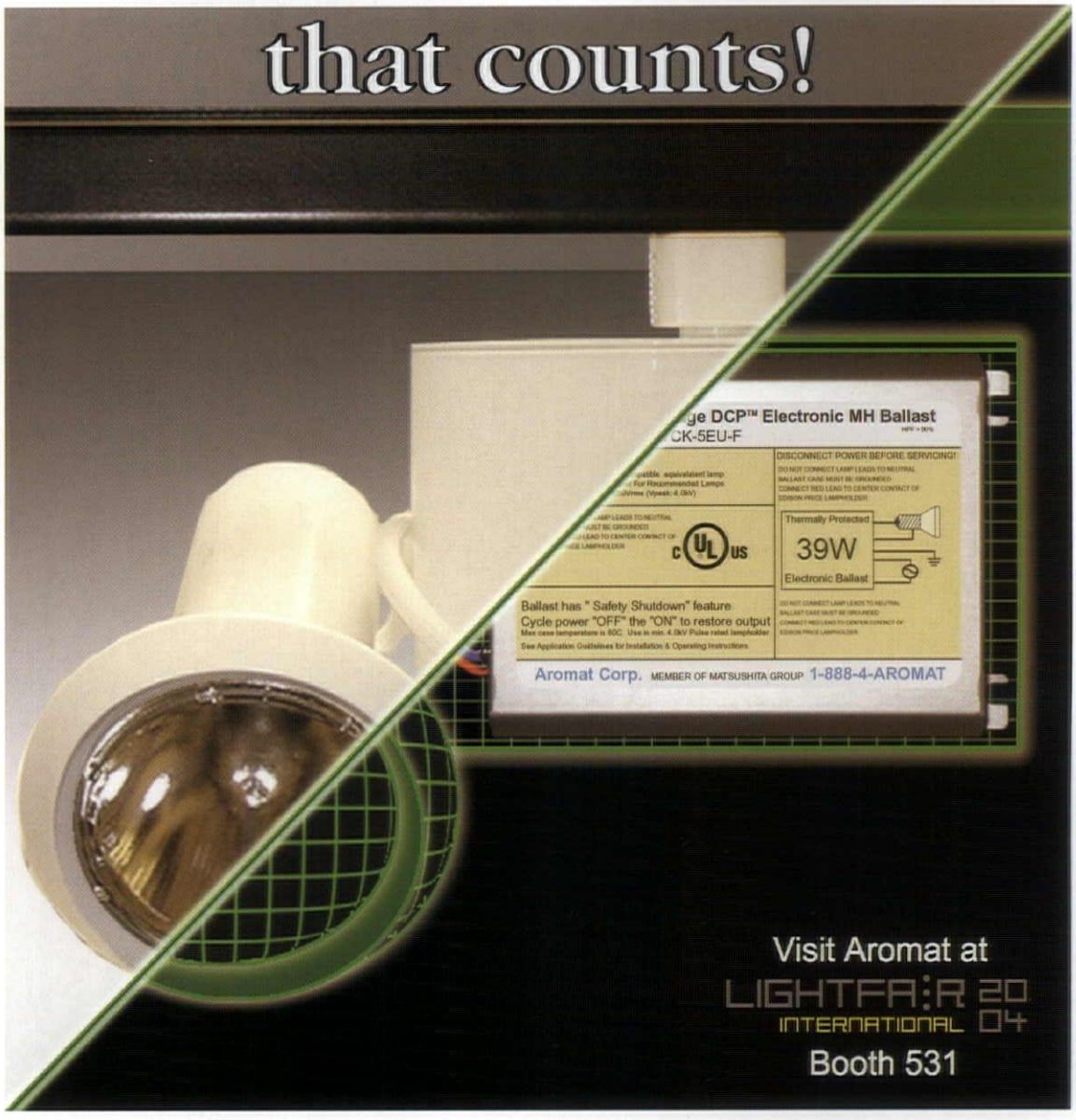
GEORGE MUELLER, CHAIRMAN AND CEO | **COLOR KINETICS**

I see abundant evidence to the contrary; not only is the industry not commoditized, it's reinvented. From the New World Center in Hong Kong, to Caisse des Depots in Paris, to the Time Warner building in New York, lighting is undergoing a transformation—both in the tools and technologies that enable it, and in the extraordinary designs and applications that manifest it. And it's not just in the lighting of spaces. Advances in the industry will find new and previously unimaginable uses. For example, researchers continue to explore the link between light and health, including Alzheimer's disease and seasonal affective disorder. Within 20 years, virtually all lighting will be semiconductor-based, and this will open a completely new realm of possibilities via intelligent, highly controllable, energy-efficient light. Imagine luminous walls, lighting systems that communicate data, and a 50 percent reduction in global energy use for lighting. For me, it's like living through an accelerated adoption of the automobile, cell phone, computer or Internet—and the chance to break ground with new lighting technology is exhilarating. Nails and bricks may be commodities, but the architecture industry thrives. As designers continue to break boundaries in their use of light, the underlying tools and technologies will flourish, and so too will the industry as a whole.

ZIA EFTEKHAR, PRESIDENT | **LIGHTOLIER**

The changing technologies of light sources, materials and electronics, as well as architectural fashion, continue to provide rich opportunities, product innovation and growth. As Lightolier celebrates its centennial anniversary, we build our products with materials and methods previously unavailable or uneconomical. The rising power and falling cost of semiconductors has transformed the power supplies we use. And new communication technologies give us a degree of control not practical before—for example, the remote control of individual track lights or individually addressable office and school lighting systems. You only have to look around to see how differently spaces are lighted today than a generation ago. Notwithstanding the similarity of fixtures throughout the industry, there are more choices than ever before. Perhaps the problem is one of expectations. Why should customers be satisfied with today's mainstream products? Imagine the impact if we raise customer expectations—better visibility and health for a wider range of users, more individualized control, better environmental impact—and then deliver!

It's what's inside



Sometimes, what's inside is what really counts! All lighting systems are made up of 3 essential components; a lamp, a fixture and a BALLAST. It's the ballast you don't see but it's the ballast's performance that will really make your lighting system stick out amongst the rest.

So the next time you build, design or order lighting fixtures with Ceramic Metal Halide lamps make sure they are powered by...

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