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architectural lighting

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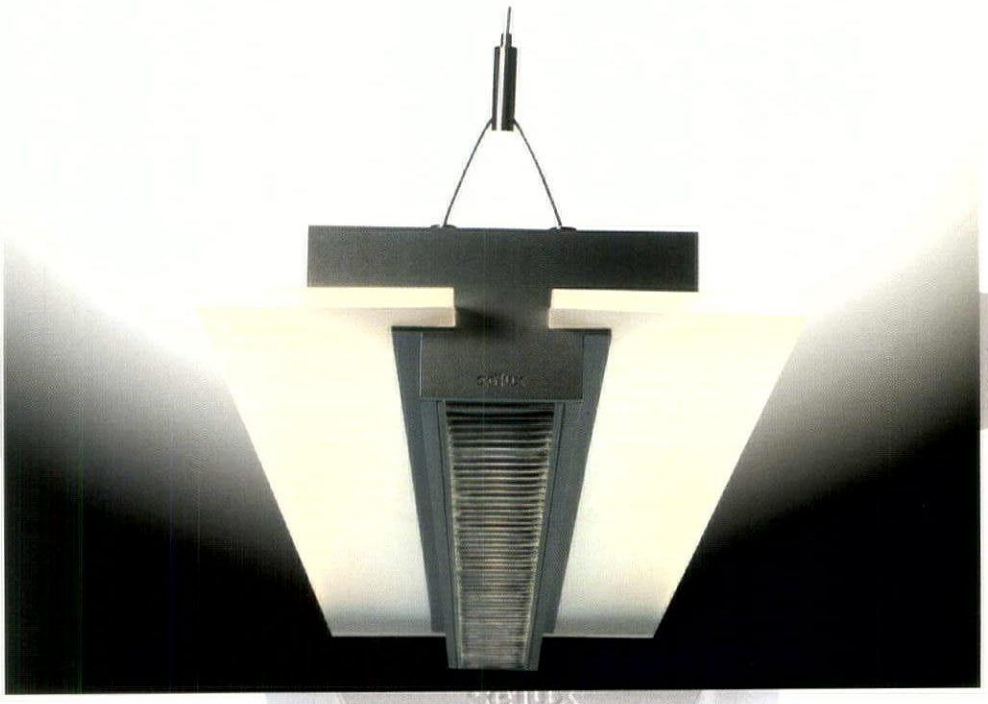

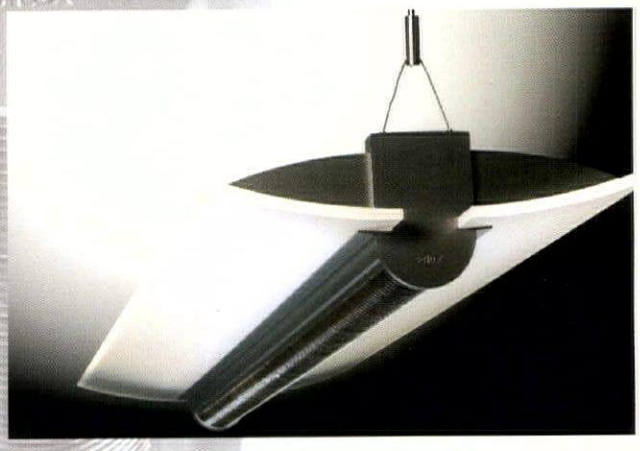

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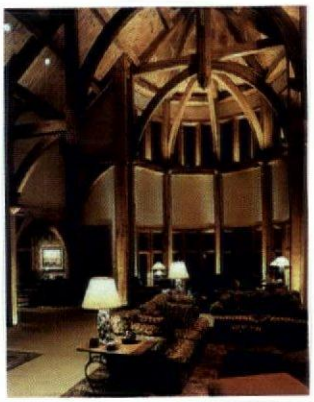

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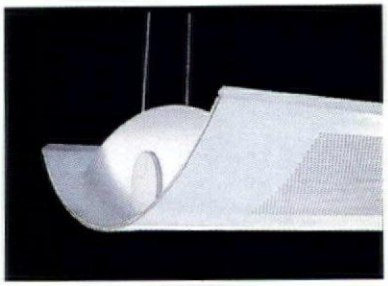

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Architectural Lighting (USPS 000-846, ISSN 0894-0436) is published eight times per year (Jan/Feb, Mar/Apr, May, July, Aug/Sept, Oct, Nov, Dec) by Miller Freeman Inc, 600 Harrison St., San Francisco, CA 94107, phone (415) 905-2200 and is distributed free of charge to individuals or firms engaged in the specification of lighting products in the US and territories. The cost of all other subscriptions in the US and territories is $48 per year. A one year Canadian subscription, payable in US dollars, costs $60 and all other foreign, $86. Periodicals Postage Paid at San Francisco, CA and additional mailing offices. Standard Mail (A) Enclosed. POSTMASTER: Send changes of address to Architectural Lighting, PO Box 1061, Skokie, IL 60076-8061. Architectural Lighting is a trademark owned exclusively by Miller Freeman Inc, a United News & Media Company.

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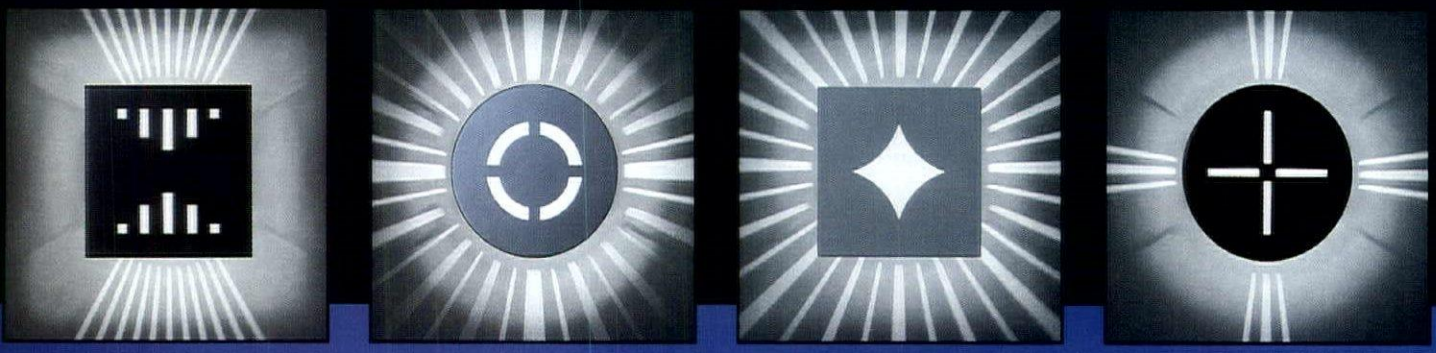

Location:
Greater Atlanta Christian School's Fine and Performing Arts Center

Architect:
John Andrews Architect, Inc.

Lighting Designer:
Michael Angelo Tortora, Newcomb & Boyd Lighting Design Group

Photography:
Kieran Reynolds

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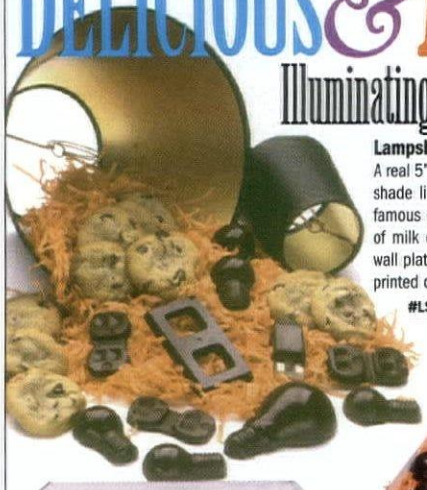

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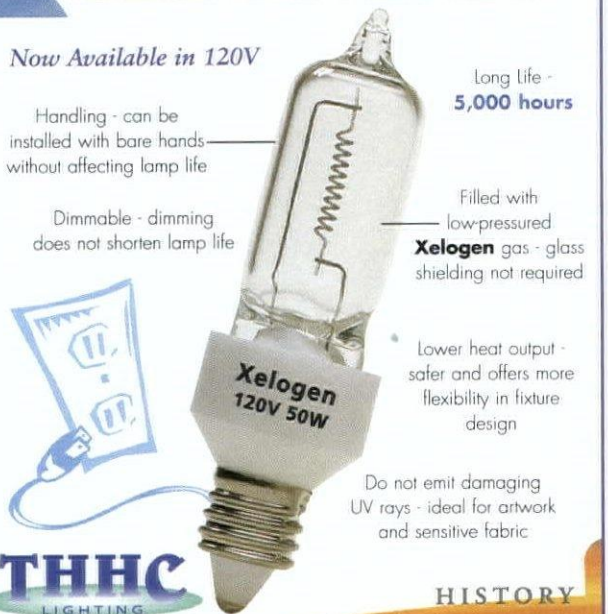

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Production	VINCE HABICK	(415) 905-2454 fax (415) 905-2236
List Rental		(847) 619-9800 fax (847) 619-0149
Circulation	WENDY SAAR	(212) 615-2687 fax (212) 279-4460
	CUSTOMER SERVICE	(800) 255-2824 fax (847) 647-5972
Reprints	VICKI BREWSTER	(516) 365-2646 fax (516) 681-7315 62 Northwoods Rd. Manhasset, NY 11030

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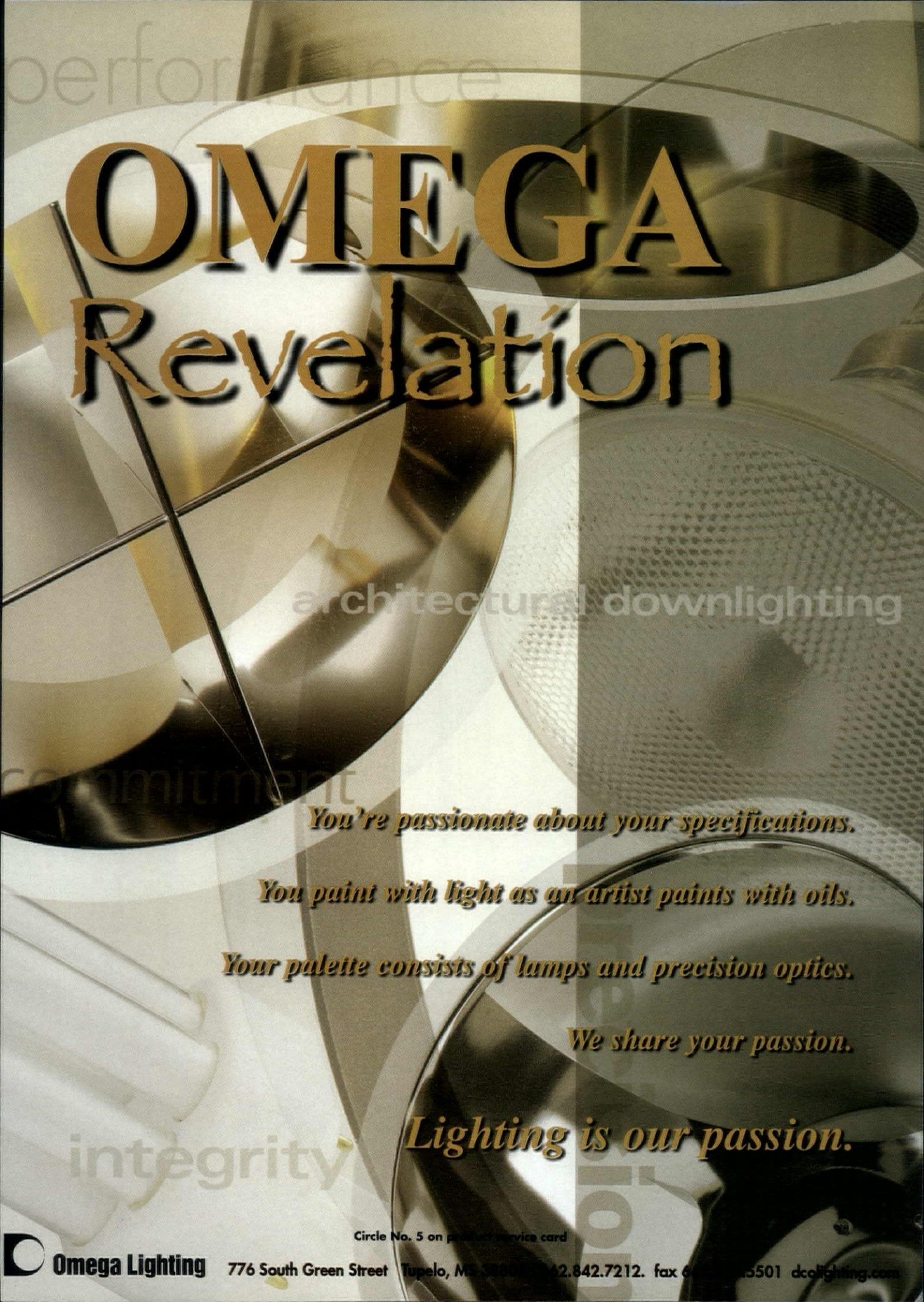

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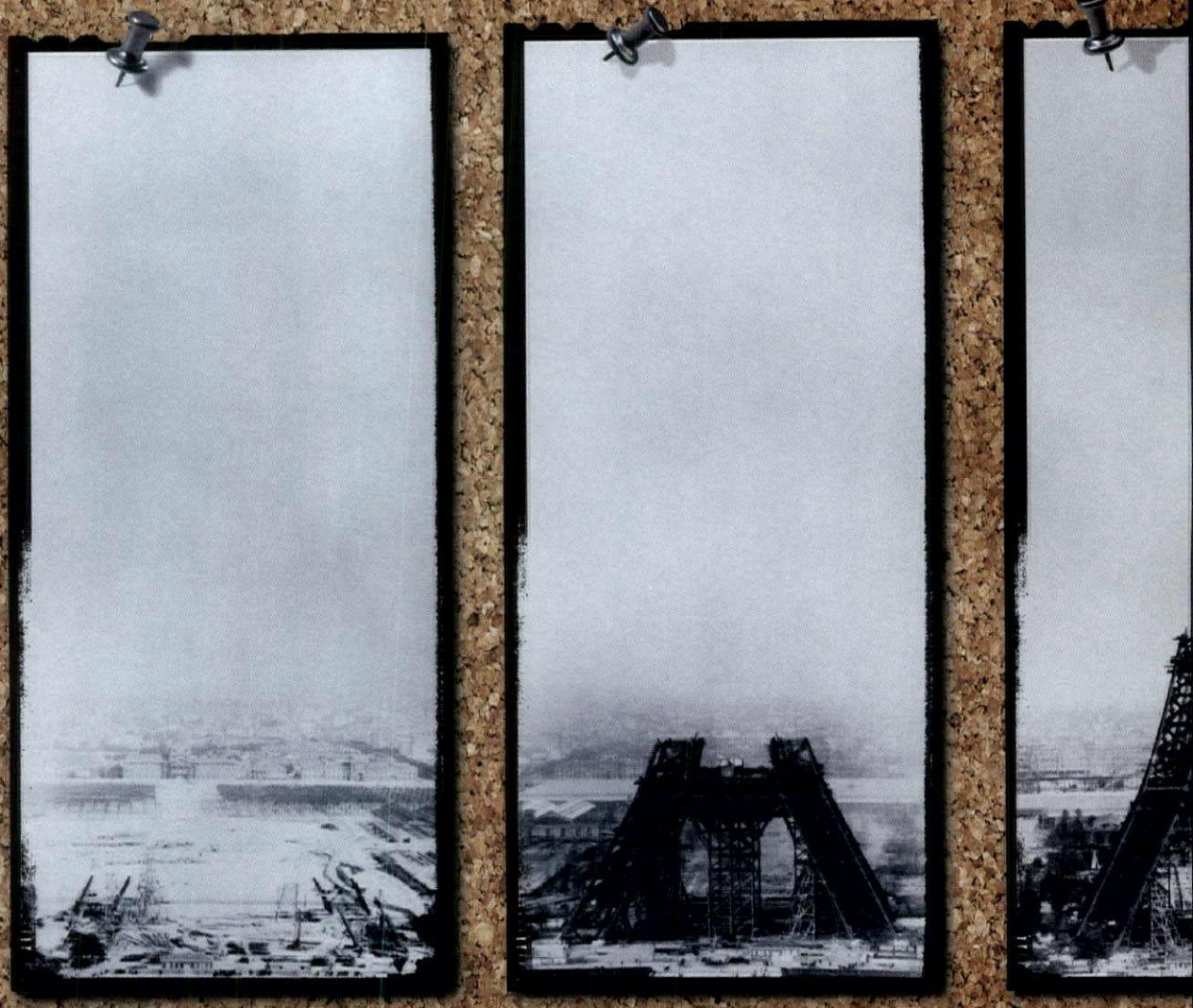

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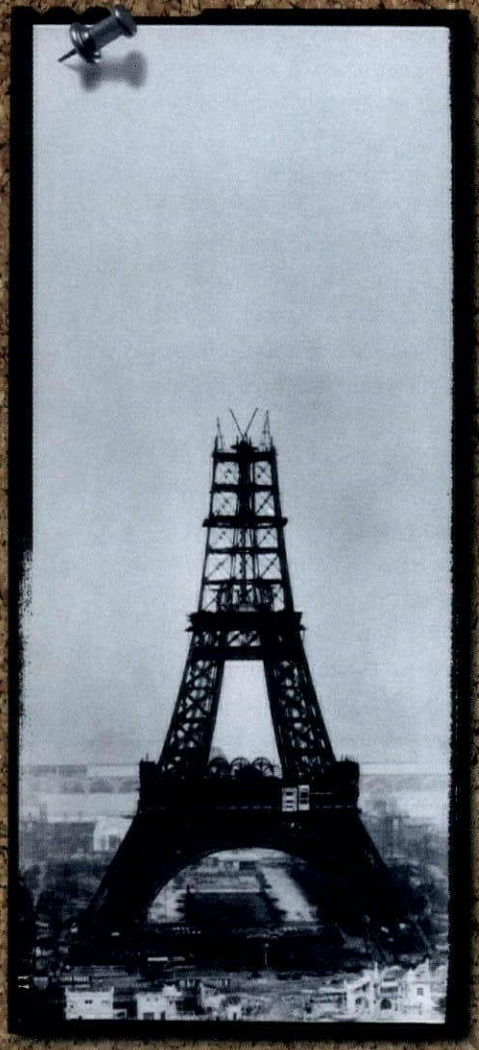


editorial

LIGHT IN THE FAST LANE

"I want it and I want it *now*." How often have we all heard this demand? Better yet, how often have we all demanded it?

Specifiers are going to the Internet in increasing numbers to get product information. In a recent Wayman Group study, 31 percent of *Architectural Lighting* readers considered the Internet to be one of the "most valuable media to keep up with developments in [their] profession," versus 21 percent from just two years before, while the importance of manufacturers' reps declined from 82 to 77 percent.

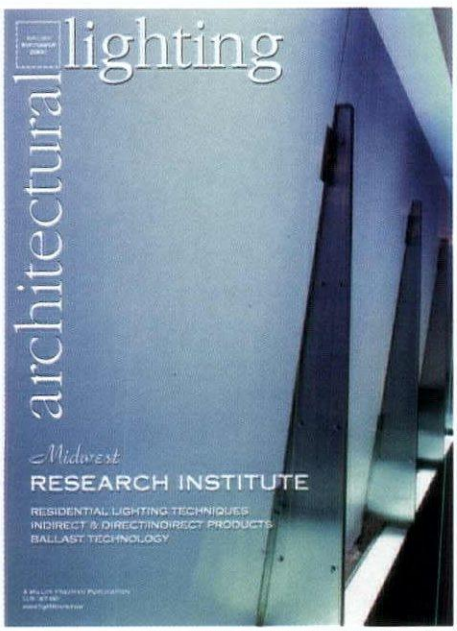
The advantage of the Internet is that—technical problems aside—it always answers the phone and provides information on a 24/7 basis. In addition, it's convenient: browsing many products at one time has never been easier. In the same Wayman Group study, specifiers overwhelmingly cited product information (catalog sheets, product application photos and the like) as the most valuable form of information available on the Internet.

This is not to say that there is a trend that will point to the demise of the sales rep or, egads, magazines, which still rank the most valuable medium for specifiers to keep up with developments in their profession (92 percent). But it does pose a challenge to both to "reinvent" themselves. The Internet is not this dreaded invader the media makes it out to be, and it cannot do everything; it can and will, however, perform those business functions that it can do best, taking them away from people who will then focus on their core strengths to add value to the distribution channel.

PHOTO BY CHRIS LAMB

CHRISTINA TRAUTHWEIN, EDITOR-IN-CHIEF

Regarding magazines, they face an interesting problem. Most trade magazines, including *Architectural Lighting*, *Architectural Record*, *Interior Design* and others, use "bingo cards" so that readers, seeing great new products and services in an ad, can respond to get sales contact and/or more information. Magazines remain the most popular form of obtaining information for specifiers, and yet cannot get the specifier in touch with the manufacturer as fast as the Internet.



COVER PHOTO: ©MATT MCFARLAND

Architectural Lighting is about to change all that.

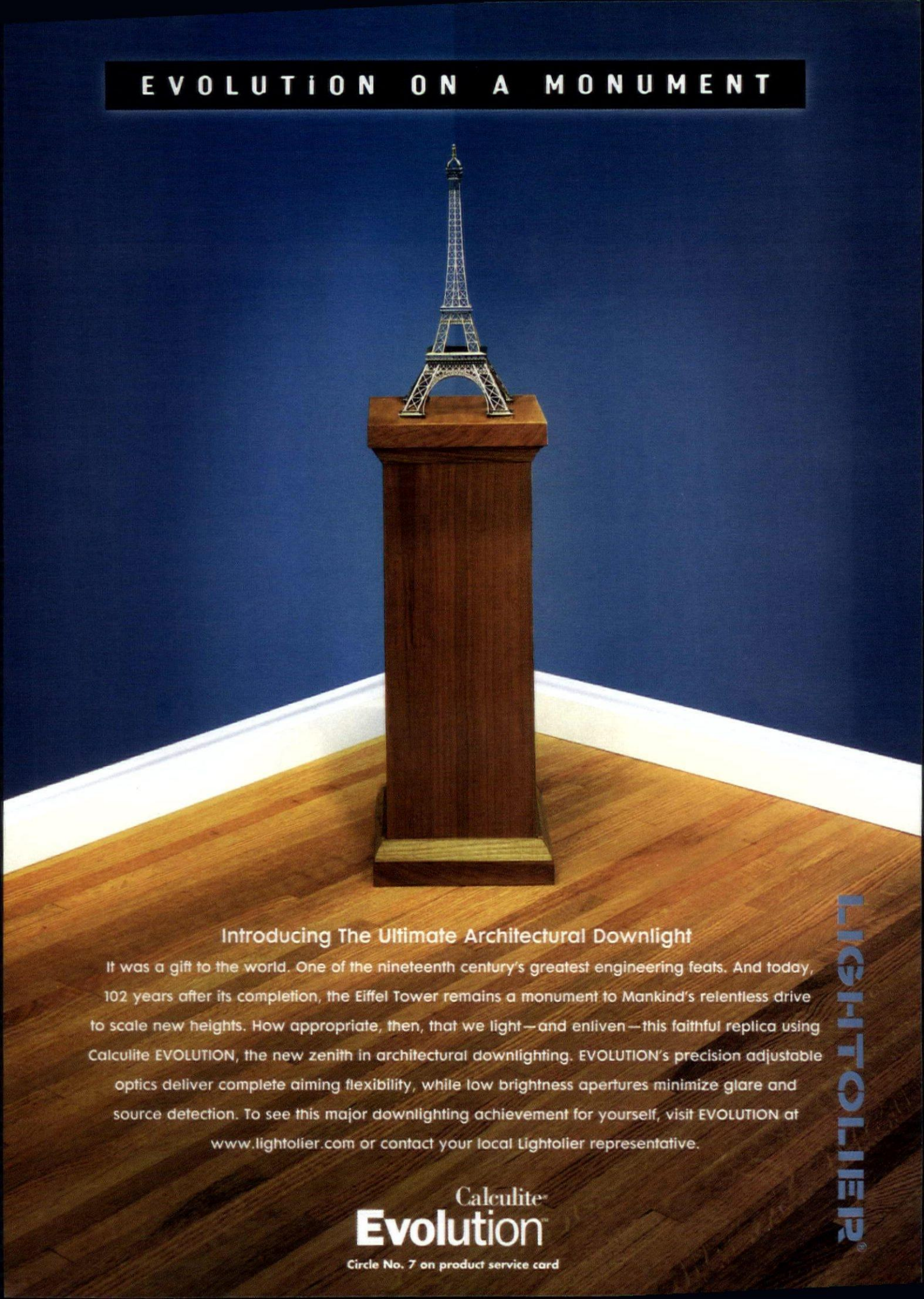
We're proud to announce that with this issue, our magazine now offers a revolutionary form of reader service in addition to the traditional bingo card. If you see a product you like in an ad, you can go to www.lightforum.com, our website, then click on "Marketplace." Once inside, you register to get a password, which you only have to do once and takes about a minute (we ask the same information as was required to subscribe).

After that, you can view ads with additional information right there. You can email the manufacturers for immediate sales contact, email them to get product literature and catalogs, email them to ask technical questions or make comments, download catalog sheets and click through to the manufacturer's website.

By using our new reader service, you get the exact information you want, and better yet, *you get it immediately*. We believe that this new system combines the best of the magazine and the web.

Please give it a try at www.lightforum.com, then click, "Marketplace." Email me at ctrauthwein@mfi.com or Craig DiLouie, publishing director, at cdilouie@mfi.com to let us know what you think and if it is valuable to you. And be sure to check out Lightforum.com's many other features that may be of interest. ■

EVOLUTION ON A MONUMENT



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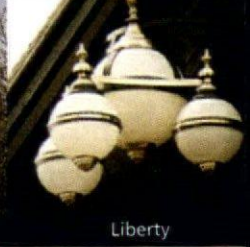

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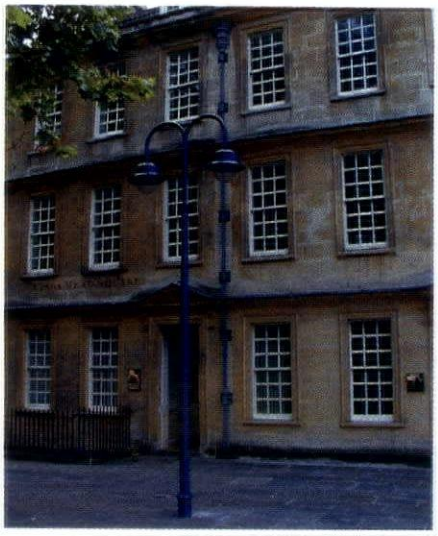
Mike Smith Designs Ltd have provided lighting solutions for two key projects in architecturally sensitive areas of England.

Kings-Mead-Square
City of Bath



The historic city of Bath has its origins in Roman Britain but became popular as a tourist resort in the Georgian era due to health giving properties of its spa. It's immaculate Georgian and late Victorian architecture has survived and conservation is therefore a priority when any new planning application is made.

The Kings-Mead-Square development called for lanterns which were of a contemporary design but also enhanced the traditional Georgian and Victorian architecture. In order to satisfy the design requirements of both architect and conservation officer Mike Smiths Designs held consultations and produced graphics showing options for consideration, whilst still using modern lighting techniques.

Kings-Mead-Square has café's and bars but is also a major thoroughfare and therefore requires lanterns with quality road distribution optics and sufficient light to meet the requirements of British Standards.

A solution was found in the 'Split Ring System' which provides a well engineered foundation to the decorative exterior of the lantern.

The system comprises two cast aluminium rings that are hinged and locked in place, when in operation, by three finger release stainless steel clips. The upper ring houses the optic and the gear tray.

The Split ring foundation allows for any design of upper body to be fitted onto the circular upper ring and for virtually any shape of glazing bowl, from flat glass to a tear drop, to be suspended from the lower ring. The implications for the scheme designer are significant in that they can have a lantern designed for them, or by them, that is ideal for their particular scheme without having to compromise by taking the option of a catalogue pick and that their design will be mounted upon a highly engineered foundation that all engineers will be happy with.

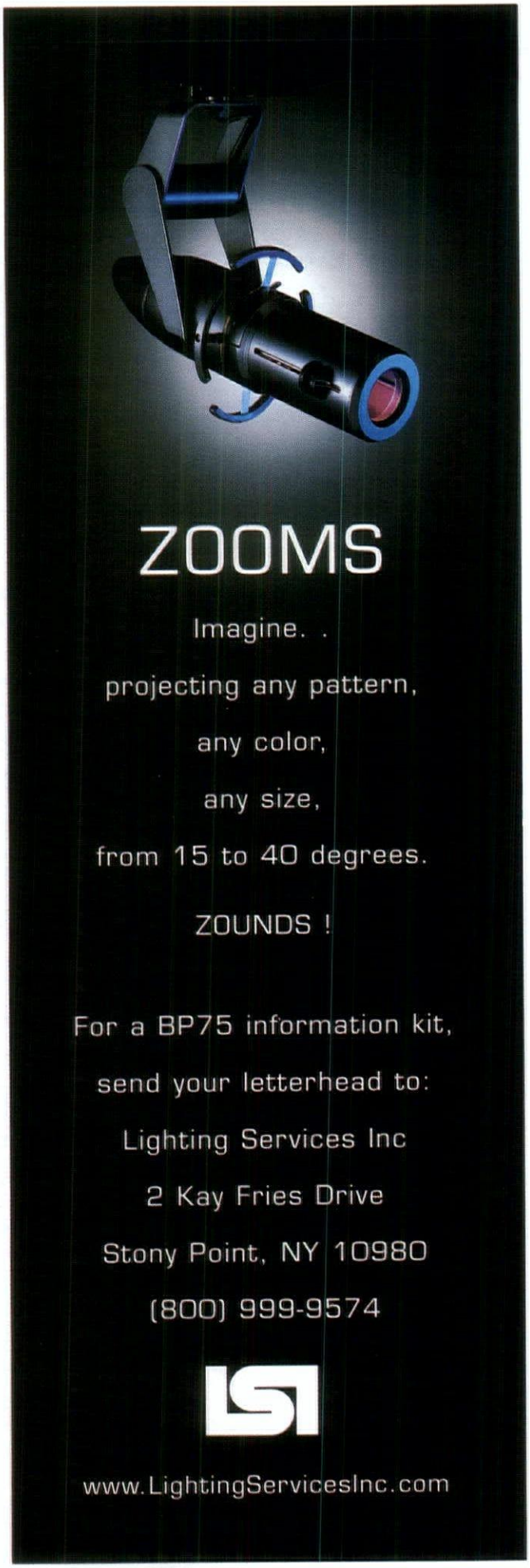
The final scheme has had excellent reports from both the conservationists within the Bath tourist office and the local authority.

It only took Mike Smiths Designs 8 weeks to design, manufacture, prototype and supply this project.

American Ambassadors Residence
Regents Park , London

The American Ambassadors new residence required existing lanterns and columns to be replicated. They had to be in keeping with the grandeur of the mansion aesthetically, but have modern lighting technologies inside. Security lighting also needed to be incorporated to give instant lighting during emergencies. Balanced lighting was also required for night use so that CCTV could work to full effect.

Mike Smith Designs provided the solution with a 70W Metal Halide lamp for general night time use. The excellent colour rendering provided the required clarity for CCTV. Tungsten Halogen Lamps were used for emergency purposes as there is no delay or warm up time from switch on. A combination of aluminium castings & heavy gauge aluminium were used for lantern construction to give longevity of life & strength. Both customer & contractor were completely satisfied with the end product and the service provided by Mike Smith Designs.



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letters

To the Editor:

The article, "Slim Picks—T5 Direct/Indirect Technology," in the March/April 2000 issue describes a version of our Aria "waveguide" luminaire, which uses a single center-mounted T5/HO lamp. This fixture is actually a separate product called Orea, one of several new T5 and T5/HO product offerings from Zumtobel Staff, and it uses two T5/HO lamps. Also, the continuous-mounting connectors used with the Claris luminaire are made of extruded aluminum, not plastic as stated.

It is clear that T5 and T5/HO luminaires can significantly change the quantity and layout of fixtures from traditional T8 arrangements, and the article mentions that the Claris fixture can generate 70 fc on a workplane. This is correct for single T5/HO units, not standard T5 as stated, but typical only for configurations designed for demanding high-illuminance applications such as laboratory spaces. However, when the row spacing of indirect/direct fixtures increases from 8-12 ft. to 15 ft. or more, the direct portion of light may be concentrated beneath the fixture rows. In this sense, purely indirect systems may provide more uniform illumination than indirect/direct units. A balanced indirect/direct lighting scheme may still yield the best solution but fewer fixtures spaced further apart increase the need for careful consideration of luminaire and layout choices.

There are certainly many other issues around this technology and its applications that could be addressed. I look forward to continuing the discussion as specifiers and manufacturers continue to learn from the growing number of projects utilizing T5 and T5/HO light sources.

Erik Svanholm
Applications Engineer
Zumtobel Staff Lighting
Highland, NY

To the Editor:

I always enjoy reading *Architectural Lighting* and I was especially interested in the article on Radio City Music Hall, which appeared in the March/April issue.

Originally, there were eight ceiling coves illuminated in four colors—red, blue, green and amber. These coves used individual reflectors with standard PS-type lamps and borderlight-type colored glass roundels.

The article states that the house lighting was done with PAR-type lamps. PAR lamps were not developed until sometime in the late 1930s. It is possible that throughout the years the house electricians could have substituted PAR-type lamps for the original PS lamps.

The article also states that the lighting control system was the world's first preset system. This is incorrect. The General Electric Company furnished a multi-scene present system for the Chicago Civic Opera in Chicago, IL back in 1929. This entire control system is now in an archive in Kansas City, KS.

Lyman C. Brenneman
via e-mail

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MERGERS & ACQUISITIONS

Nordic Aluminum has announced that the business operations of the lighting division of **Kaltek, Inc.** were merged into Nordic Aluminum, Inc., effective July 1, 2000. The company can be reached at Nordic Aluminum, Inc., P.O. Box 8805, Atlanta, GA 30356, phone (770) 455-5986, fax (770) 455-5988.

Denver-based architectural firm, **RNL Design** has finalized the acquisition of Klages Carter Vail & Partners (KCV) of Orange County, CA. As of July 1, 2000, the firms will operate as RNL Design in the U.S. and as KCV+RNL abroad. For more information, contact Lida Citoren at (303) 295-1717.

Cannon Design has announced its merger with Dworksy Associates, a Los Angeles-based architectural firm. Cannon Design's West Coast practice will be known as Cannon Dworsky; Robert L. Newsom, FAIA will serve as managing principal of the consolidated practice.

Vari*Lite International has announced an agreement to sell its operations in Belgium, the Netherlands, France and Sweden to an investment company that owns Focus Showequipment B.V. in Amsterdam. The company has also sold its operations in Madrid, Spain to an investment group led by the managers of VLPS-Madrid.

STUDENT SCHOLARSHIPS INTRODUCED

Color Kinetics Inc. has established The Color Kinetics Scholarship in Lighting, which will be awarded annually to a second-year student enrolled in the Master of Science Program in Lighting at Rensselaer Polytechnic Institute's Lighting Research Center (LRC). The scholarship will support the student's thesis work in the area of solid-state lighting by providing the recipient's full second-year tuition and awarding him/her with a research assistantship.

The 8th annual **Broadway Lighting Master Class** will be held December 7-10 in New York City. This year, the program is introducing a new scholarship contest, "I Want My BLMC!" to increase participation by university students interested in the field of professional lighting design. Fifteen scholarships will be awarded to students 18 years of age and older who are currently enrolled in good standing at universities in the U.S. and abroad. For more information, click on the BLMC button at www.etecnyc.net. The deadline for applications is October 15, 2000.

COMPANIES ACHIEVE ISO CERTIFICATION

MagneTek Lighting Products has successfully completed ISO 9000 certification at all of its manufacturing locations. Throughout a two-year period, all of the company's manufacturing facilities worked to meet all ISO 9000 standards, achieving ISO 9001 and ISO 9002.

W.A.C. Lighting has also achieved ISO 9001 certification at its 120,000-sq.-ft., overseas manufacturing facility, which employs more than 330 engineers, designers, production and support personnel. The company's corporate offices and eastern distribution center are located in Garden City, NY.

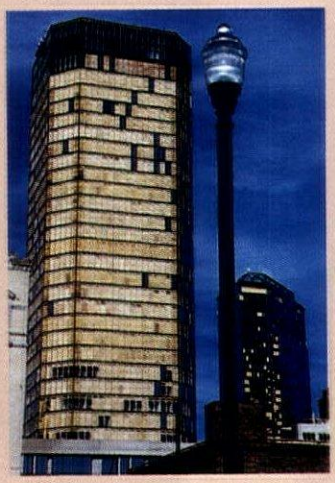
FIBER OPTICS FIRM FORMED

Visual Lighting Technologies has announced its formation and the hiring of its first employees. Led by company president, Daniel Haydt, the new firm will specialize in designing complete fiber-optic lighting systems with initial efforts focusing on systems for themed environments, the related entertainment industry and hospitality environments. Visual Lighting Technologies can be reached at 23352 Madero #J, Mission Viego, CA 92691, phone (949) 248-3119, fax (949) 496-8459, website: www.visual-lighting.com.

Did You Know....?

After tornado winds ripped through Fort Worth, TX earlier this year, the only lighting fixtures that remained intact were Granville fixtures from Holophane. The units, which use 150W HPS lamps, are installed in the parking lot of the historic First United Methodist Church, located near downtown Forth Worth. Damage caused by the storm reportedly exceeded $400 million.

The tornado received an F2 rating, which meant that winds reached 160 to 180 miles per hour. Destruction from the storm extended in a half-mile radius around the church, toppling trees, damaging buildings and overturning cars.



Because the First United Methodist Church occupies an entire city block, the 30 Granville fixtures, mounted on 12-ft. black Wadsworth aluminum poles in the 300 ft. x 300 ft. church parking lot and anchored in 48 in. of concrete, were fully exposed to the storm. Church official Sid Johnston, noted, "The area where the fixtures are located was probably hit first during the storm."

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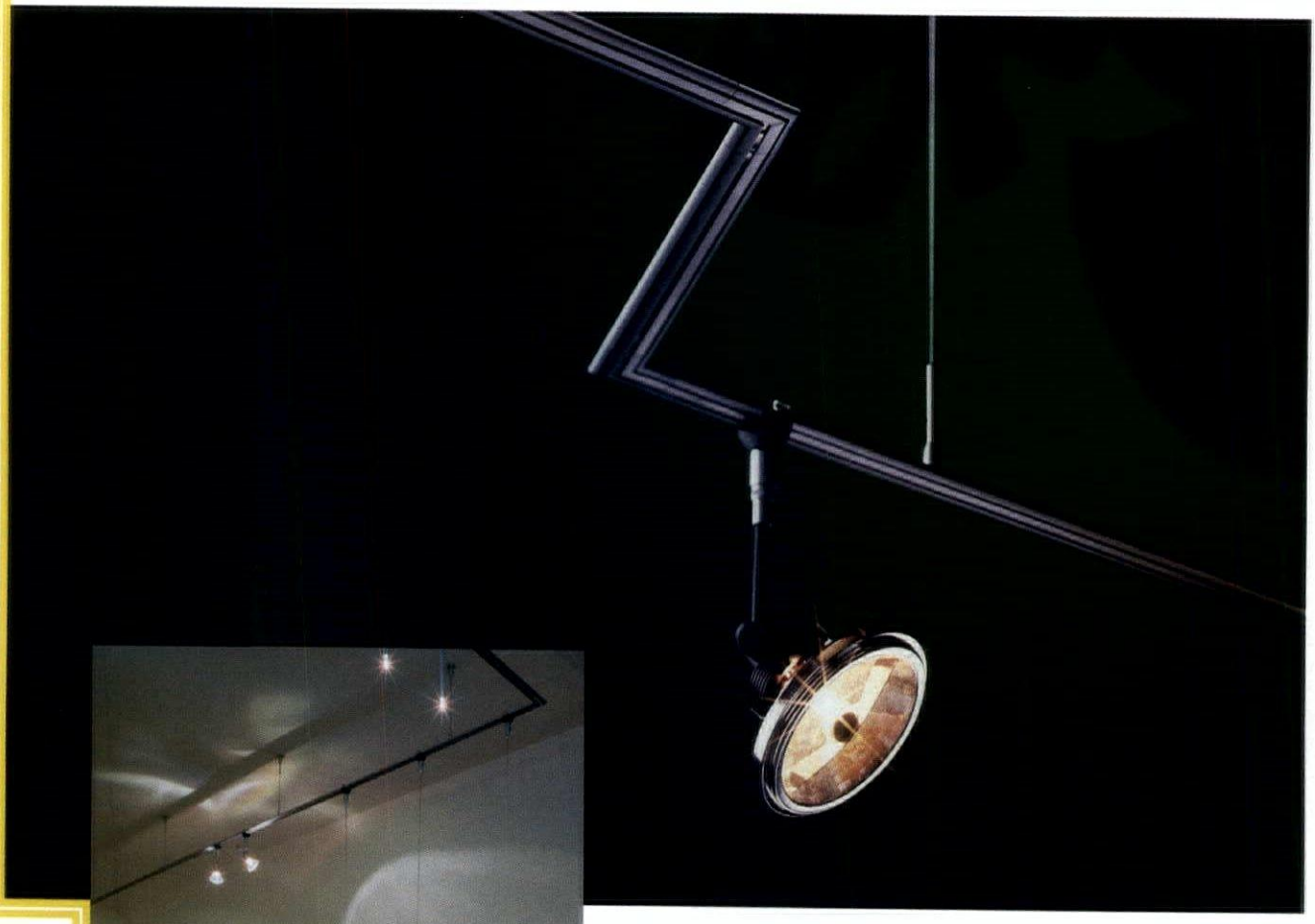

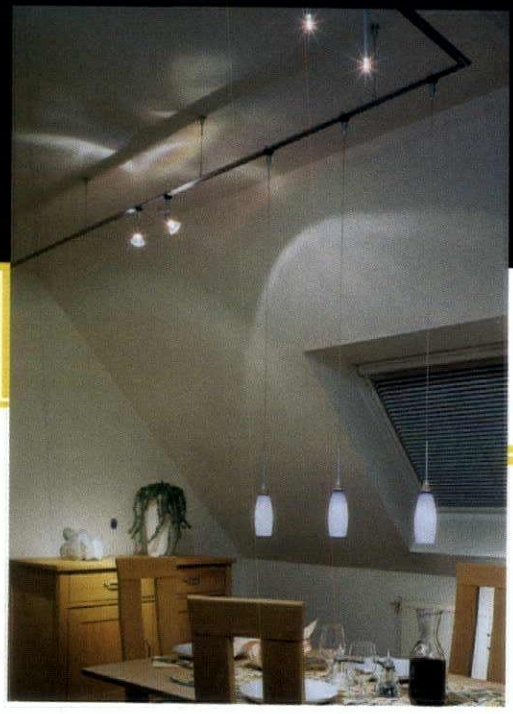

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NEW NAMES, NEW FIRMS, NEW OFFICES...

David A. Mintz, Inc. Lighting Consultants has changed its name to **The Mintz Lighting Group Inc**. The company's new email address is: design@mintzlighting.com.

H.M. Brandston & Partners is now **Brandston Partnership, Inc.** The company has also relocated to 122 West 26th Street, New York, NY 10001; phone (212) 924-4050, fax (212) 691-5418, www.hmbp.com.

The Lighting Design Partnership has been relaunched as the Lighting Design Partnership International (LDPI) to reflect its increasingly international profile. In addition to locations in the UK, LDPI also has offices in Asia and Australia. For more information, visit the company website at www.ldp-i.net.

Kling Lindquist has announced the opening of an office at Woodbridge Place in Iselin, NJ. The new office will focus on assignments from clients in the central/northern New Jersey and New York City areas and is located at 517 Route One South, Suite 3000, Iselin, NJ 08830; phone (732) 404-2900, fax (732) 283-3243.

ON THE WEB...

MagneTek Lighting Products has launched www.lowprofilelighting.com, a website that highlights the latest development of low-profile ballasts.

Lightolier's online educational program, "Lessons in Lighting," has been updated to include additional lessons. The program can be accessed through Lightolier's website at www.lightolier.com by clicking on "Lessons in Lighting Online."

Product catalogs and specification sheets for **Crescent/Stonco Lighting's** complete line of HID and fluorescent lighting fixtures and accessories are now available at www.crescentlighting.com and www.stoncolighting.com.

CORRECTIONS

In the March/April issue, the phone number listed for Erco was incorrect. The correct phone number is (732) 225-8856; the correct fax number is (732) 225-8857.

In the article, "Maintaining Control—Specifiers Discuss the Systems," also from March/April 2000, lighting designer Rogier van der Heide's discussion of the lighting of the Millennium Dome refers only to the Mind Zone portion of the Dome. Other parts of the Millennium Dome were lighted by other designers and consultants.

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people
UPDATES

Steven J. Parker, LC has been named president of Lightech Electronics North America, Inc.

Advance Transformer has appointed **Vince Lostumbo** national sales manager, energy market development.

Alan Mitchell and **Gavin Fraser** have joined the Lighting Design Partnership International.

B-K Lighting has appointed **Steve Smith** national sales manager and **Craig Thomas** marketing manager.

Beverley K. Shimmin and **Shannon A. Kowski** have joined Candela.

Cosentini Associates has named **Bruno J. Spiewak, PE, AIA** director of the Chicago office.

Gilbert Abraham, AIA, Lonia Adams, RA, Cindy Camp, ASID, Douglas Crawford, Raymond Doyle, PE, Alan Flora, AIA, Michel Gauthier, DPLG, Rodger Huff, AIA (posthumously), **John Murphy, AIA, Allen Reed, AIA, Harry Zackrison, PE** have been named associates at SmithGroup.

Kling Lindquist has promoted **Jeffrey L. Matthews, AIA** and **Richard F. Mang, AIA** to project director, corporate/commercial sector; **Mark J. Caraccia, RA** joins as project director, high technology sector.

Dave Meagher, Neil Mishurda, Andre Siew-Yeoung Yew, Heather Stagl and **Lucia Palmitess** have joined Horton•Lees Lighting Design.

The International Association of Lighting Designers has upgraded **Laura Antonow, Faith Baum, Linda Cummings** and **Scott J. Hershman** to professional status. **Barry Citrin, Alison Ford, Louise Lalande, Robert F. Mapes** and **Enrique Rojas** have also joined as professional members.

John E. Steiner has joined SLI Lighting as VP and general manager of the Power Lighting Products Division.

Barganier Davis Sims Architects Associates has named **Ray E. Williams** principal and **Frank W. McKinnon** associate.

Brennan Beer Gorman Monk/Architects & Interiors has named **Ginger Revercomb** principal.

Pierre Sabourin, PE has been named director of electrical engineering at SME Consulting Engineers, Inc.

The Design Collective has promoted **Scott Vieth, AIA, Tom Liebel, AIA** and **Christopher Harvey, AIA** to associate.

Did you get a promotion? Hired new employees? Let us know so that we can keep our readers up-to-date on what's happening in your firm or company. Fax your announcement to Alice Liao at 212-279-3955 or email us at aliao@mfi.com.

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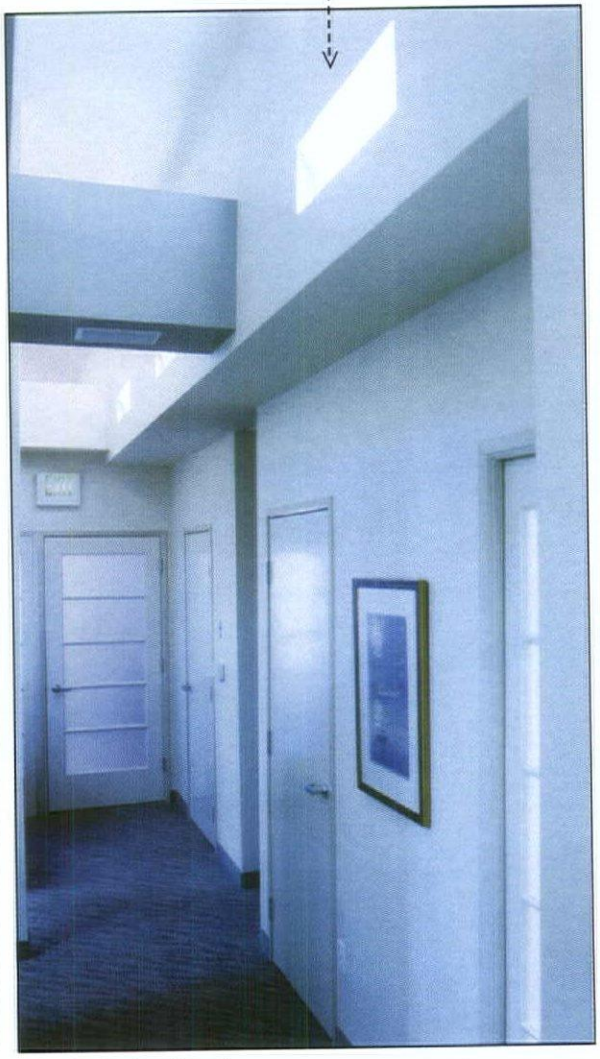

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Circle No. 16

calendar
UPDATES

2000 Scheduled Events

October 2 "Revisiting a Classic," Designers Lighting Forum, Los Angeles; (310) 535-0105, www.DLFLA.org.

October 8-16 Athens to Rome: Architecture 2000 trip; (800) 975-7775, email: aia@travelmgmt.com, www.travelmgmt.com/aia.html.

October 11-12 Philadelphia Lights 2000, Pennsylvania Convention Center, Philadelphia; (610) 544-5775, email: osheasr@aol.com

October 11-13 Intertech 2nd Annual Conference: "Commercializing OLEDs—Assessing the Market, Technology & Business Outlook for Organic Light-Emitting Devices," Catamaran Hotel, San Diego, CA; (207) 781-9800, fax (207) 781-2150, email: deborahc@intertechusa.com.

October 11-14 The Hong Kong International Lighting Fair, Hong Kong Convention and Exhibition Center, Hong Kong; (852) 2240-4388, fax (852) 2824-0249, www.hklightingfair.com.

October 19-20 National Council on Qualifications for the Lighting Professions (NCQLP) Lighting Certified (LC) Exam Workshop, Lighting Design Lab, Seattle, WA; www.northwestlighting.com.

October 20-22 LDI 2000, Sands Expo & Convention Center, Las Vegas, NV; (800) 288-8606, (303) 741-2901, www.ldishow.com, www.etec-nyc.net.

October 30-November 4 N.Y. DesignWeek, Jacob K. Javits Convention Center, New York; (800) 677-6278, www.merchandise-mart.com.

November 1-2 NeoCon New York, Jacob K. Javits Convention Center, New York; (800) 677-6278, www.merchandisemart.com.

November 1-3 Luminaire Asia 2000, Singapore International Convention & Exhibition Centre, Singapore, Singapore; (65) 220-76-33, fax (65) 220-97-33, www.hfasin.com.

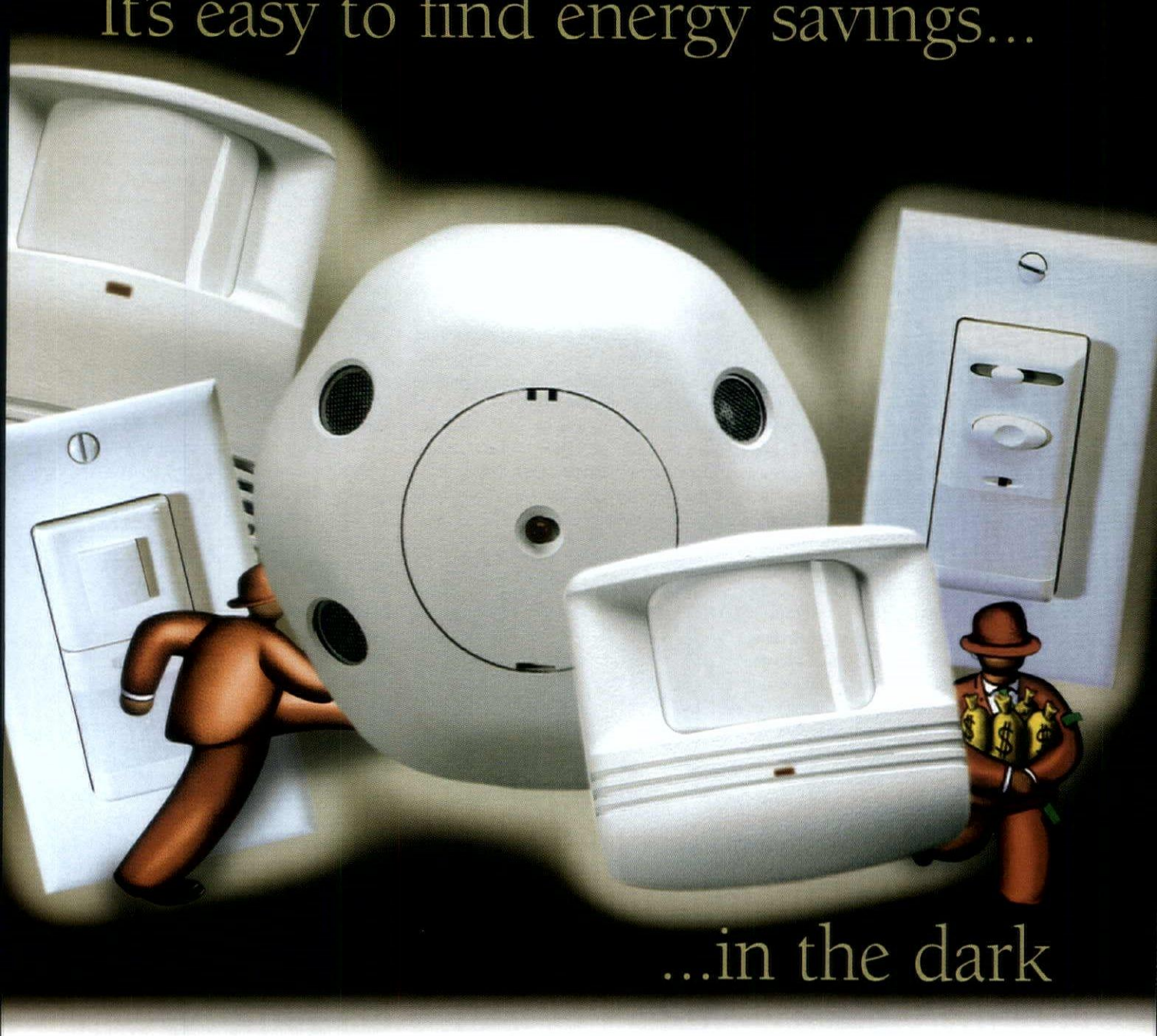
November 4 NCQLP LC Exam; (301) 654-2121, fax (301) 654-4273, email: info@ncqlp.org.

November 6 "Getting the Green Light—Annual Landscape Lighting Meeting," Designers Lighting Forum, Los Angeles; (310) 535-0105, www.DLFLA.org.

November 6-9 Computers for Construction 2000 & A/E/C Systems Fall, Anaheim Convention Center, Anaheim, CA; (800) 451-1196, (610) 458-5472, fax (610) 458-1553, email: maten@penton.com.

November 14-16 16th Annual Build Boston, World Trade Center Boston, Boston; (800) 544-1898, www.buildboston.com.

November 29-30 AEE seminar: "Fundamentals of Energy Management," Phoenix Civic Center, Phoenix, AZ; (770) 447-5083, www.aeecenter.org.



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insights

In this issue, Architectural Lighting *interviews Renée Cooley, principal of Cooley Monato Studio in Manhattan. From her involvement in photography and its dependence on light as a medium, Ms. Cooley's interest in lighting design for architecture and the environment emerged. Soon after her 1984 graduation from Yale Graduate School of Art, from which she earned a Masters of Fine Arts in photography, she began working with Light & Space Associates, Ltd. where, as a senior designer, she participated in a number of projects including The Solomon R. Guggenheim Museum renovation and expansion, recipient of a lighting design award from the IALD. In 1991, she began Renée Cooley Lighting Design. Emily Monato joined her a year later and in January 2000, the firm became Cooley Monato Studio. The firm's diverse portfolio ranges from contract to residential to retail. As a board member of the NY Chapter, Ms. Cooley is active in the IESNA. Other affiliations include the DLF and the IALD. In addition, Ms. Cooley is on the faculty of Parson's School of Design where she teaches a studio course in the MA-Lighting Design Program.*

—Christina Trauthwein

AL: *How did you get started in the field of lighting design?*

Cooley: I got started because I needed a job. After earning my MFA in photography from Yale in 1984, I decided to travel to the Big Apple to photograph. As a means to support myself, I started working in a commercial art gallery. It was rather high-pressure and just didn't fit either my personality or my career vision, so I looked in the newspaper for another job. And there it was. "Light" appeared in large letters followed by the posting for an administrative assistant. It went on to describe the position as seeking someone interested in art and design to work for a lighting design firm. It piqued my interest and I decided to check it out. The firm turned out to be Light & Space and the employer, Peter Barna, a talented lighting designer and a fantastic man, hired me. At that point in my life, I didn't want a career, just something that would pay the bills and let me enjoy being a photographer. And a job as an office assistant, I thought, would allow me to do just that.

AL: *And the transition from balancing a checkbook for Peter to designing with light?*

Cooley: Well, Peter would do mockups and invite my opinions. I had been involved in various exercises during my graduate program in which critical thinking was required so I wasn't shy about discussing things in terms of art, design and composition. And because my concentration was in photography, it was obvious that my eye was trained to see light—not only the quantity of light but the quality of it. Furthermore, describing light in terms of quality was also part and parcel to the art background that I had developed from working in galleries. Peter began to involve me more and more in design projects and then one day, someone else moved in front of the typewriter and I moved over to the drawing board. He began to teach me lighting design with an approach that I now use with my students—and I think it's the backbone of the philosophy that I have. He would tell me to begin by looking at plans and elevations and using a colored pencil to sketch in the light where I wanted it to be. He wanted me to model the space, to make it look like what I wanted it to look like and would then tell me *how* to do it. He'd say, "You be the artist and I'll be your technician and tell you how to make it happen. What you do is look at the light quality *first* and then lastly we'll choose the fixtures to do the job." He taught me to develop my concept first and then back it up with the technical knowledge that was necessary to achieve my design.

AL: *Peter recognized your eye for design and was willing to help you develop the skills necessary to turn your vision into reality. What do* you *look for when hiring?*

Cooley: Because we're a small firm, I look for someone who has a background in both the art and science of lighting. If a person is technically oriented and they don't have what it takes as far as design and art is concerned, I don't think that it can be taught to them. However, I do think that a person who has a propensity toward design can be taught how to hone in on that attribute and gain the technical understanding if they apply themselves. As a matter of fact, I have hired students from the Fashion Institute of Technology (FIT) who had only one class in lighting, but exhibited talent in terms of their design potential and equally important, possessed a strong curiosity and motivation to learn. Emily (Monato) and I taught them the more technical aspects and helped them to refine their artistic abilities. It's so important to develop a student's potential to the fullest extent. Just as Peter opened the door for me, I feel equally moved to do the same for others. Really, the primary reason I teach at Parson's is to complete the circle: Giving back what has been given to me fulfills my responsibility as a professional.

AL: *Do you believe that the drive to master technique has been lost to the more technical aspects of lighting?*

Cooley: Since I teach at Parson's, which is primarily a design school, I'm a bit biased in terms of that. In looking at the applications for this upcoming year, I had a chance to see firsthand students' letters explaining why they wanted to attend the school, and so many of them said it's because it's a great design school. Consequently, I meet the kinds of students who seek to refine their designs and back them up with the technical, not the other way around. I firmly believe that even though a person entering the field might have a great grasp on how to do a calculation program, they should know how to do it by hand. There's a certain feeling you get for the material when you take a more tactile approach to design. Sometimes, when I'm running Lumen Micro, I can immediately tell when there's something wrong with it because I've done that from the ground up—I haven't just leaned on the computer to do it for me. I have a feeling for what a calculation ought to be from experience. When you're in a design meeting and the architect and interior designer want to know just about everything in that first session, you have to be able to rely on "rules of thumb" that can be applied to answer certain questions. If you're going to do some quick estimating just to set a platform, an initial meeting, that sort of response is required. And you reach that by acquiring knowledge through experience. You can't say, "Wait a minute, I'm going to run Lumen Micro on it."

AL: *In terms of design, what's one lesson you hope your students or employees have learned from you?*

Cooley: You really need to think about things three-dimensionally. What I do, and what I hope that the people who work for me do, is to take a mental image of a space—a moving image. When I walk through a space, envisioning it before me as I have in

(Continued on page 24)

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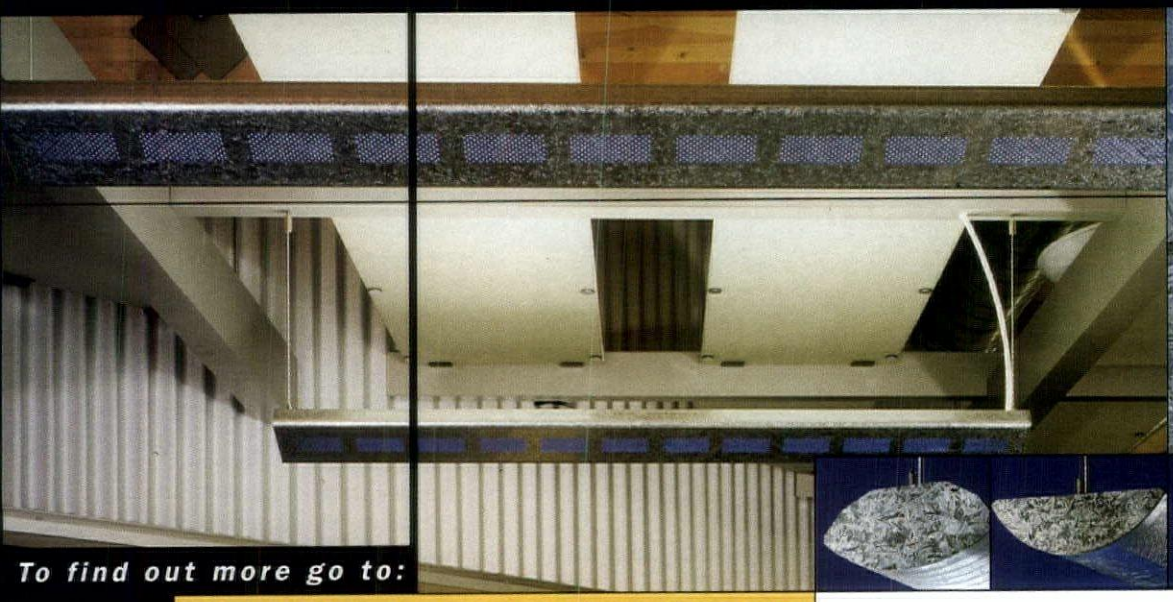

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(Continued from page 22)

my mind's eye, I visually record that image as one would with a video camera and then do the drawings and add the details needed to create that image. And while it's extremely important at the beginning of a project to have a strong mental image of what you want, it is just as critical as the project progresses and changes occur to refer to that picture you've etched in your mind and refresh it—you can't look at changes in an ad hoc way. If you firmly build that mental image right from the beginning, you'll have a stronger mental concept from which to work, from which to specify and lay out. You can then respond to changes by recalling that image and how the change affects the overall space and not just that one aspect. Keep the whole picture in mind to avoid forming tunnel vision.

AL: *Tell me about the challenge of starting your own firm.*

Cooley: At the end of 1991, I started my own business because a client with whom I had worked while employed by Peter came back for the second phase of an extensive job for Hasbro, on which I had been senior designer. When Peter declined the job—he decided to teach full-time at Pratt—they turned to me. Now in 1991, as many of us may remember, people were being handed pink slips left and right. It wasn't as if I could easily walk out into the world and get hired by another lighting design firm. No one could. Instead, and even better, a 70,000-sq.-ft. project was handed to me. There was divine intervention, I'm sure. Several other large projects such as the Jakarta Convention Center and Liberty Science Center came right on the heels of that. So it was nonstop work. I was extremely fortunate. As a matter of fact, some of our jobs today are referrals from those initial projects.

AL: *Recently, you changed your firm's name from Renée Cooley Lighting Design to Cooley Monato Studio. How did Emily Monato enter the picture?*

Cooley: Emily and I got together in 1992 after David Mann, an architect with whom I had worked many times, thought I might like to meet with her. I had a tremendous amount of work at the time and desperately needed another lighting designer to help me fulfill the workload. It was a bit scary to hire somebody at that point in my career, as I had been in my own business for only six months, but I needed the help. At the same time, she had been looking for something on a temporary basis. So I hired her, we kept getting business, and her employment status became permanent. We have been partners since 1993, but continued to operate under my name because it was more established. It was only very recently that Emily agreed to add her own name to the firm. Interestingly, the question has arisen, "Why did you drop 'lighting' from the name?" Our feeling is that while we are lighting designers, we have a broader definition of art and design and we feel the word "studio" embraces that philosophy. It's a more open definition of what design is and how we want to represent ourselves.

AL: *You have an MFA in photography. Do you photograph your own projects?*

Cooley: No, though I'll take snapshots. Where I do use my camera in relation to my work as a designer is as an instrument for inspiration. I photograph light and its particular effects—maybe a reflection of rippled water onto a surface or sunlight coming through my apartment window and how it looks on a tablecloth. When something catches my eye, I take a picture and put it in a little notebook. Then when I'm in a schematic design that is testing the waters and pushing me into that phase of "I've got to think of something here," when my brain needs stirring, I take a look through what I've collected in my idea book—sometimes to find an applicable solution, sometimes just to take me out of the mundane office environment and let me dream as an artist, to dream in light.

USE LIGHT TO SHAPE THE SPACE, NOT POSSESS IT.

AL: *What is your design philosophy?*

Cooley: First and foremost, I look at light as a medium, not an object. I consider its effect on how it defines physical property and makes things visible to us. I use light to describe form and surface. And it is in this way that light describes a piece of architecture as a three-dimensional space. These are the objective qualities of light. Secondly, but not necessarily in order of preference, I think about how it's applied, the composition and qualities used to describe the architecture as a place where things happen, a place that has a feeling and purpose and how it molds our perceptions of a space. Light in that sense has a subjective quality. Light is the body language of architecture—it gives that extra meaning to the space. As a result, I have a tendency to do more architecturally integrated lighting—illumination that emanates from the architecture—than a design that uses decorative fixtures gratuitously to light the space, unless there is specific meaning to adding a visible design element.

AL: *What professional values do you hope you've instilled in those who've worked for you?*

Cooley: While each of us has a personal challenge to solve a problem, there is also a moral obligation to develop a solution in a way that is considerate of a client in terms of use and maintenance. Some people can get so wrapped up in their own design egos that they forget about the fact that someone else has to live with it and manage it. Is it going to be so difficult to maintain that I'm leaving them with a problem? If the answer is yes, I have failed my job as a lighting designer. I also am a firm believer in not quitting until you get there. Don't slide on an answer. Keep trying. Do what you have committed to do.

AL: *Where would you like to see the profession heading?*

Cooley: I would like to see it continue to develop itself in terms of design. In some ways, the computer—the technical aspects, the electronics—often overshadows the art. I think the computer is invaluable in producing what we design, but it's still a tool. Design quality issues must continue to be our primary focus. Even the IES changed their *Handbook* and added Chapter 10 on quality issues, backing off that quantitative, formulaic approach to the standards in lighting and allowing more reasonable illuminance levels with a quality measure inherent to them. That's a wonderful indication of what's ahead. And as we and the world advance within this electronic age, hopefully, more tools will become available to grow our intuitive side in a way that no computer can really replace.

AL: *And the largest obstacle to advancing the field?*

Cooley: "I want it yesterday." Schedules that are too short don't allow for appropriate design thinking and coordination. In addition, budgets that are short-sighted in terms of looking to short-term capital outlays instead of long-term lifecycle so that, for example, energy-efficient metal halide fixtures get kicked off the job because they're expensive even though a lifecycle analysis might prove that in the long run they are more affordable. ■

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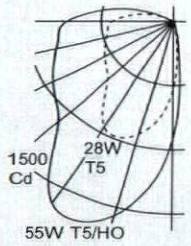

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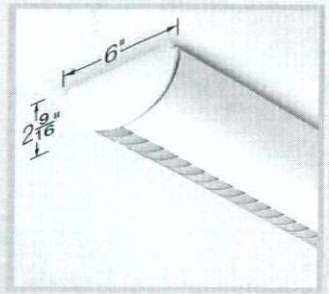

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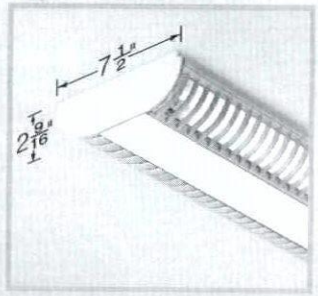

two way*

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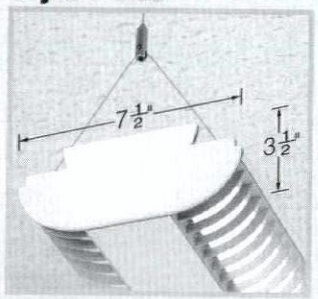

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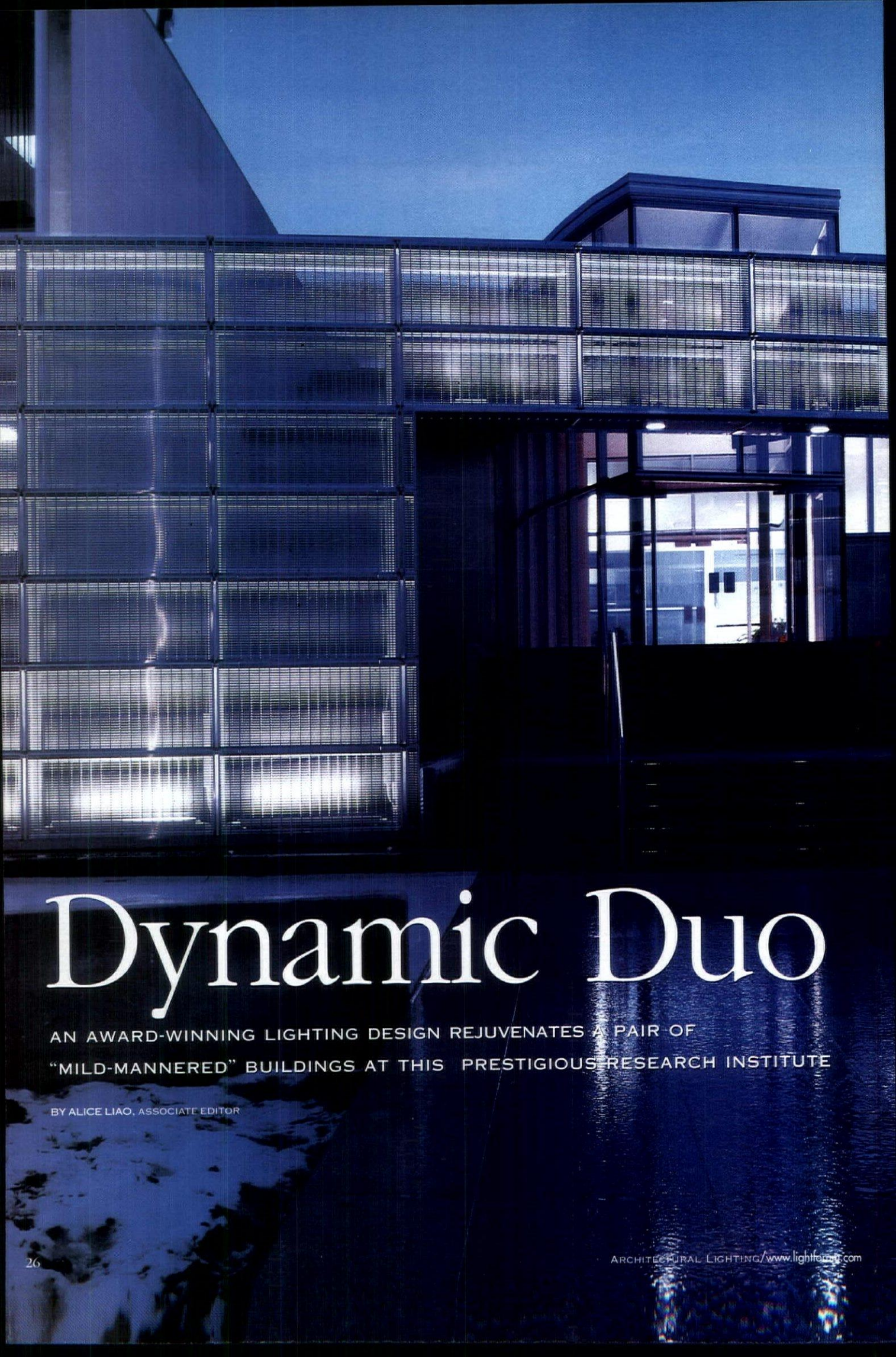

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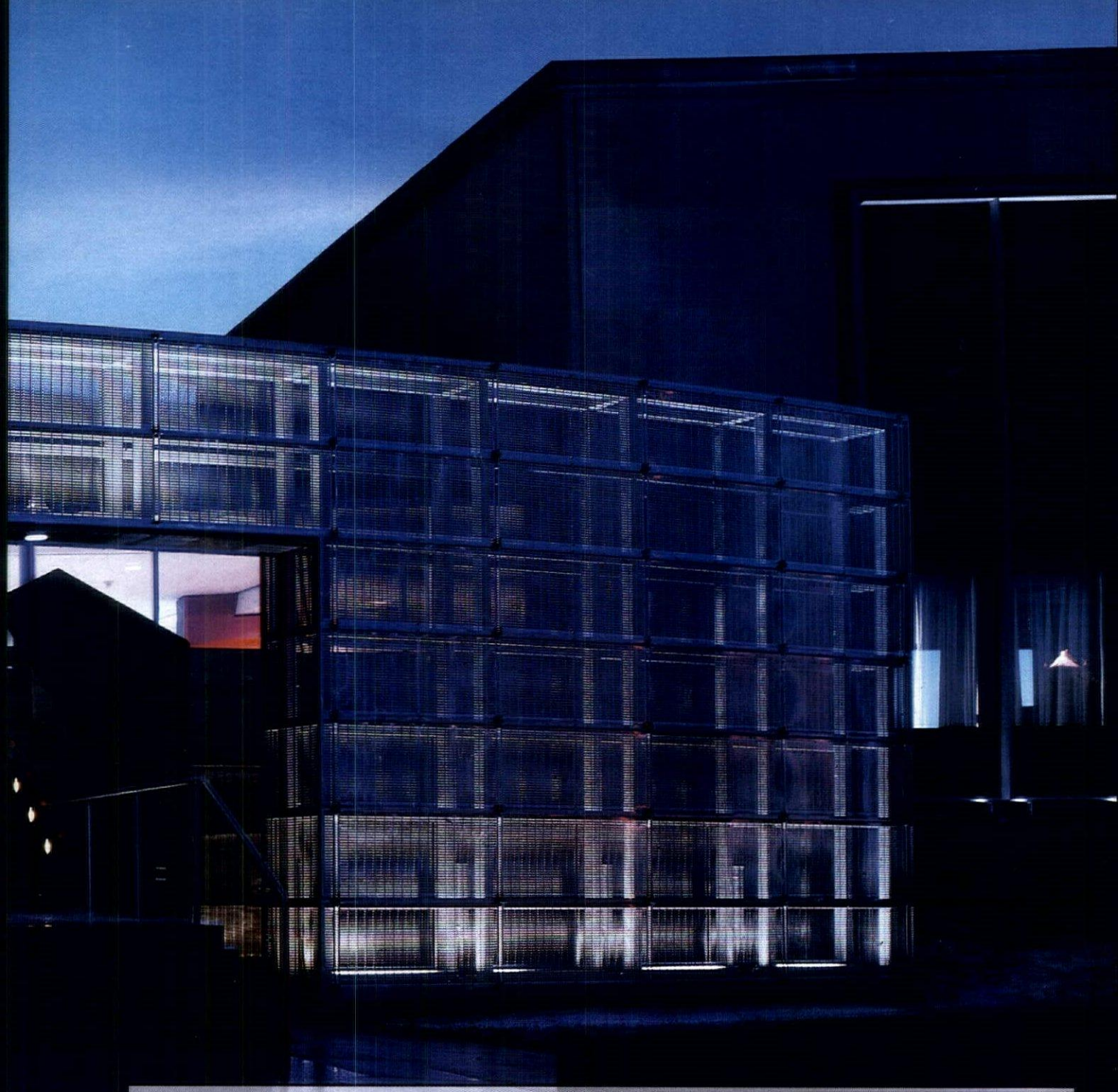
BY ALICE LIAO, ASSOCIATE EDITOR



Until last year, the Midwest Research Institute (MRI) assumed a rather quiet existence on the grassy sidelines of Kansas City, MO's Volker Boulevard. Perched no more than 90 ft. away from the busy street, its two long, sprawling structures—each 1½-stories high—boasted a non-descript, 50s-style architecture that revealed little of the high-tech and often high-profile pursuits that have decorated the MRI's 56-year history. "They're such a world-renowned institute but their buildings were outdated and have been there forever," said lighting designer Bruce Yarnell, principal of Yarnell Associates, Architectural Lighting Design. "You could drive by and not notice them or realize that anything special was happening inside." Last year's collaboration between Yarnell and architect Rafael Garcia of Rafael Associates aimed to resuscitate the MRI from local anonymity by giving it a physical presence commensurate with its impressive track record and competitiveness in an age of diminishing research dollars.

OPENING SPREAD: SIGNLIGHT FIXTURES EQUIPPED WITH 3500K FLUORESCENT LAMPS ILLUMINATE A MASSIVE METAL SCRIM WALL, ACCENTUATING ITS TRANSPARENCY AND INVITING REFLECTION ON THE NATURE OF SCIENCE. SPIKES OF WHITE LIGHT ON THE KIMBALL BUILDING ECHO CLASSICAL COLUMNS ON THE NELSON-ATKINS MUSEUM OF ART ACROSS THE STREET. PHOTO ©MICHAEL SPILLERS

Although the independent, not-for-profit institute was established in 1944, the first building—the Kimball—at its Kansas City site was not constructed until 1955 and is located directly across from the Nelson-Atkins Museum of Art. The Spencer Building, named after its donor Kenneth A. Spencer, was added in 1972. Together, the two provide 207,000 sq. ft. of laboratory, office, information management and administrative support space. Applications of MRI's technologies and research range from candy-coating M&Ms to agent studies of the "Gulf War Syndrome" to the development of renewable energy strategies at the National Renewable Energy Laboratory, where over 700 of its 1,169 staff are stationed. Yet despite its prestige on the international stage of research and science, the facility enjoyed scarce recognition among the denizens of Kansas City.

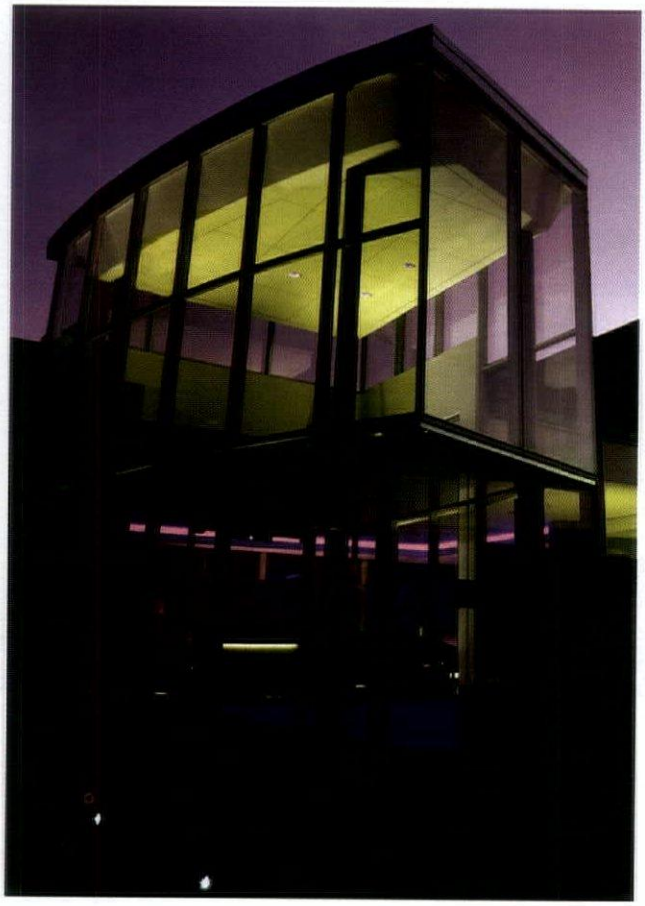
Garcia likens the facility's recent "facelift" to the fashioning of a backdrop to the landscape, plazas and boulevards that cut between the MRI and the Nelson-Atkins. "We weren't constructing the building but renovating the facade," he explained. "We moved the entrance to the center—the space between the two buildings, thereby erecting this large backdrop to a stage setting much like the figure/ground relationships. The minimalist landscape, the campus and promenades become the figure with the architecture acting as the background; the pedestrian and vehicular traffic across the street are the audience."

Thus, for Garcia, the lighting question became: "How does one illuminate the backdrop to a stage?" The answer was supplied by the lighting design team at Yarnell Associates: With white-light elegance and washes of soft lavender. "We wanted to give the MRI a new freshness at night," said Yarnell, "so they wouldn't be just two more buildings along a major boulevard but rather something that's beautiful to look at." In addition to molding a new identity for the Institute, the solution, a delicate layering of light and color, also responds to the site's proximity to the boulevard and its visual length.

VIOLET TENDENCIES

For Yarnell, the Kimball's position facing the art museum acted as a key driver in the lighting design. "The Nelson is a Neo-Classical art gallery fronted by columns," said Yarnell. "So we wanted to treat the building, though a modern structure, in a very classical way." Vertical mullions spanning the facade of the Kimball building are illuminated by twin custom MR16 uplights mounted to the base of each aluminum fin. With one per side, the uplights transform the mullions into sleek spikes of white light that mimic the columns on the museum. Visible during the day, the custom fixtures are equipped with discreet cylinders designed to blend in with the fins.

A second layer of pale violet light envelops the entire building to underscore the vertical white accents and create elegant drama. Its source, 250W floodlights fitted with special rose-indigo glass filters are hidden in a low, curving concrete wall situated directly in front of the building facade. On the restrained application of color, Yarnell remarked, "The use of color is very faddish these days and often overdone with brilliant and saturated hues; we wanted a touch of color for an updated and fresh look." The design team chose lavender because it communicates a quality of formality shared by the "columns" of white light and complements the site's geographics. "I keep returning to this point," Yarnell said, "but my first reaction to the project was that this building is so important because of its location in facing the



RIGHT: THE GLASS ENTRY VESTIBULE GLOWS WITH THE COMBINATION OF PAR30 BURIAL UPLIGHTS CONCEALED IN THE FLOOR AND PAR30 METAL HALIDE DOWNLIGHTS RECESSED IN THE CEILING.
OPPOSITE: TILTED GLASS PANELS BACKLIGHTED BY 3500K T8 SIGNLIGHT UPLIGHTS AND BLUE COLD CATHODE COVELIGHTING INFUSE THE LOBBY WITH A SENSE OF SCIENTIFIC PURPOSE.
PHOTOS ©MATT MCFARLAND

Nelson-Atkins Gallery of Art."

To reduce the length of the complex visually, a different approach was used to light the Spencer structure and parking lot. Yarnell elected not to illuminate the facade but instead uplighted the trees that dominate the left side of the complex; he explained, "We wanted to minimize the emphasis on the second building." Lamped with 5200K metal halide sources, the tree uplights punctuate the landscape and work with the parking lot fixtures to draw one's attention away from the building.

Centerpiece to the renovation, a metal scrim wall measuring 110 ft. long, 20 ft. high and 3 ft. deep combines with architectural touches of water and stone to invite contemplation on the nature and progress of science. "Because they're scientists at MRI, we wanted to take what we considered to be the basic roots of science—the natural elements of water, rock and fire—and build a sense of synergy at the entry," said Garcia. Lighting the wall, asymmetric throw signlight fixtures equipped with 3500K fluorescent lamps and mounted inside the metal structure heighten the transparency of the scrim, while a bridge formed of mini-floodlights with biax lamps and downlights fitted with parabolic reflectors continues the flow of light over and under the entrance archway. "We wanted this glowing element that you walk through before you enter the building," said Garcia, "That it's not solid was important: You can see through it and wonder what's behind science, what's the next discovery." The transparent scrim is further enriched by streaks of colored light reflected off a water trough at the base of the wall. Edgelit and point-source fiber optics line the trough and via a color wheel, gradually shift through a range of colors. The water feature is continued up the steps and paired with a black granite wall studded with glowing steplights fitted with 20W low-voltage sources. The stone and water rise above a narrow strip of grass and rocks lighted by black mini-bollards affectionately dubbed "Darth Vader" by members of the lighting design team.

MYSTERY SCIENCE

At the top of the stairs, a glass entry vestibule—newly installed to join the two buildings and break up the monotonous, horizontal expanse—appears to emanate a mysterious glow. To produce the effect, PAR30 burial uplights are hidden in the floor and supplemented by PAR30 metal halide downlights recessed in the ceiling. "We knew that the lobby foyer would be visible from the street and wanted to have a lot of light on the ceiling from an unknown location," Yarnell said. "The uplights are built into the floor and illuminate the smooth ceiling, so you walk right between them when you enter space."

In the lobby, lighting enhances the contrasts in materials and emphasizes the technological focus of the MRI. Frosted glass panels, acting as screens that separate the reception area from staff corridors, are tilted and backlighted by signlight uplights fitted with 3500K T8 fluorescents and mounted at floor level. Above, cold cathode covelighting reinforces the atmosphere of science and technology by bathing the space in cool blue light. Low-voltage MR16 accent lights recessed in the ceiling illuminate the glass surface of the reception desk, and low-voltage linear lighting tucked in a reveal outline a contour in its base. A series of 26W triple-tube compact fluorescent downlights adds general lighting.

By creating an understated lighting design for the MRI, Yarnell and his colleagues were able to overcome restrictions placed by the closeness of the buildings to Volker Boulevard and avoid distracting vehicular traffic. And yet, according to Garcia, its subtlety may in fact be the key to the Institute's newly found recognition among the local community. "If we had installed bright lighting, people would have just talked about the building or nothing at all," he commented. "How it's lighted contributes to the drama and taps into the next level of emotion. That's a level that people aren't usually exposed to." While some outside of Kansas City may forever argue that the MRI will never enjoy the popularity of those chocolate pellets that it helped to popularize—yes, the ones that "melt in your mouth and not in your hands"—its beauty and luminous grace have not gone unnoticed. This year, the MRI was honored with the Paul Waterbury Memorial Award of Excellence for Outdoor Lighting. ■

DETAILS

- **PROJECT** Midwest Research Institute
- **LOCATION** Kansas City, MO
- **OWNER** Midwest Research Institute
- **ARCHITECT** Rafael Associates—Rafael Garcia
- **LIGHTING DESIGNER** Yarnell Associates, Architectural Lighting Design—Bruce Yarnell, LC, IALD and Mark Hershman, IALD
- **PHOTOGRAPHER** Michael Spillers; Matt McFarland
- **LIGHTING MANUFACTURERS** Edison Price; Greenlee; Ardee; National Cathode; Columbia; Kramer; G.E. Lighting; Kim Lighting; Rosco; Bega; Fiberstars; Venture Lighting

Purple Haze

Behind the colorful nighttime beauty of this Miami bridge, a complex lighting design answers structural challenges with creative and efficient solutions

BY WANDA JANKOWSKI, CONTRIBUTING EDITOR

The majestic MacArthur Causeway that joins Miami to Miami Beach is the standard hammer T-shape twin bridge configuration used on thousands of roadway overpasses. But today it projects a unique night presence due to the artful aesthetic lighting created for it by Robert Daniels, Brilliant Lighting Design, Miami, FL.

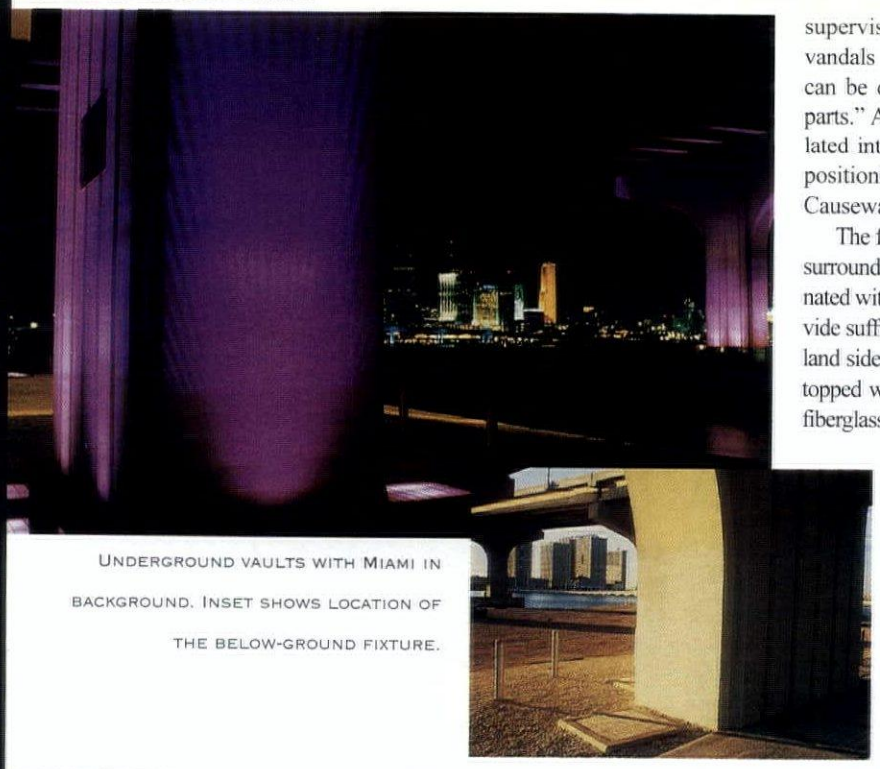
Although task-oriented, HPS roadway lighting had been installed when the bridge was constructed about three years ago, the originally planned decorative lighting scheme was abandoned. According to Daniels, the design was cancelled after tests demonstrated that the illumination levels from the fiber-optics system would not reach standards needed for long-distance viewing. The numerous stainless-steel mounts and brackets required for installation also made it an expensive system to install.

The system Daniels was called in to create, in conjunction with project engineers/architects Dinesh Dabley and Francisco Narona, Beisweinger, Hock & Associates, combines three light sources—mercury vapor (34 100W spots), metal halide (72 400W narrow spots and 204 400W horizontal spots) and fluorescent (100 fixtures each housing two T8 lamps)—fitted with magenta and blue filters. "Designing the aesthetic lighting for a bridge is complex," explained Daniels. "It needs to achieve correct brightness for appropriate impact. If there is not enough luminance, no one sees the bridge. If there is too much luminance, the lighting is overbearing for the cityscape."

The piers are uplighted with 400W metal halide fixtures fitted with magenta filters set around each base. Magenta-filtered metal halides are also set horizontally on the sides of the roadway at the tops of the hammer Ts to wash the roadway support strip. In between those units are set blue-filtered round mercury vapor spotlights. "Many times designers opt for overkill and will use 1000W metal halides where 400W units will do," Daniels said regarding his choice of wattage. "The 1000W lamp is 15-20 percent brighter but it has a wider beamspread than the lower wattage lamp. Whereas the beam is 25 degrees by 25 degrees for the 1000W lamp, the arc tube of the 400W metal halide is smaller, so focusing them is easier. Often the designer needs to push light up and only needs a 10-degree beam." The decision to use a lower wattage also resulted in significant electricity cost savings. "The electricity cost is about 4½-5 cents per kilowatt hour, so using 276 400W fixtures as opposed to the same amount of 1000W units results in an annual electricity cost savings of about $64,000," explained Daniels. "It is possible through the selection of the correct optics and fixtures to get performance without using large amounts of electricity."

There are 17 piers in between the abutments. The hammer T piers are shorter on the west end of the bridge where there are stem walls and the water is more shallow than they are on the east end. "To illuminate the walls and avoid creating scallops on the west end, we used energy-efficient, two-lamp T8 fluorescents in wet-rated sign fixtures," said Daniels. "These 20,000-hour cool white lamps are similar in color to the metal halides. So when filtering is applied, there is only a slight difference—it's 95 percent the same color."

PHOTOGRAPHY: © ROBERT DANIELS



UNDERGROUND VAULTS WITH MIAMI IN BACKGROUND. INSET SHOWS LOCATION OF THE BELOW-GROUND FIXTURE.

PIER REVIEW

On a public project such as a bridge, the lighting plan often must be reviewed and approved by city and other government officials. "We had to get approval and modifications from no less than seven different jurisdictional groups," Daniels said. "It is hard to please all of the people all of the time, but that is what is needed when designing bridge lighting." Daniels admitted that the adage "seeing is believing" rang true in regards to the acceptance of a multi-colored scheme by officials. "Originally, officials wanted white or no lighting," he explained. "But we decided to test color combinations and held demonstrations at the bridge, inviting the reviewers to come. When they saw colors, they forgot about white."

There are several ways to achieve color in outdoor installations. The light sources themselves can project blue or green tones. But for a broader color palette, filters are required. "Manufacturers only offer about four colors in light sources but with filters, you have hundreds of color choices," Daniels explained. "Filters start out at the least expensive level with gel that lasts from about an hour to one night. Acrylic translucent is good for about 50 nights. Polycarbonate lasts for about 200 nights. Impregnated or coated glass will last about five years. Dichroics will last almost indefinitely." Pure red and green could not be used in the color scheme due to Coast Guard requirements, since they are used for channel markers and channel access, respectively.

"We chose to use permanent colored filters on this project, which gave us a very wide selection of colors from which to choose," said Daniels. "However, that became a hindrance, as we had over 20 different color schemes requested by local officials. This eventually was narrowed to three choices and finally, the magenta with blue spots was the final choice." At first rejected by several officials, the concept of a blue spot over each pier was unanimously approved when a hue was chosen that matched the adjacent blue bridge. Daniels added, "The blue spot reflecting in the water, along with the magenta color of piers, creates a most beautiful reflection when seen from the shore."

LIFE SPAN

Fixture placement was influenced by the bridge structure and the need for vandal-proofing. "Unlike a building, a bridge has no security supervision," said Daniels. "All of the fixtures had to be located so vandals and thieves couldn't reach them. A beautifully lit bridge can be destroyed within months by criminals who sell wire and parts." According to Daniels, anti-vandal measures not only translated into housing durability features, but also determined fixture positioning. He commented, "From the way the MacArthur Causeway fixtures are positioned, a pedestrian can't hit them."

The fixtures positioned on the side of the roadway and at the water-surrounded pier bases are not visible from the roadway. Glare is eliminated with 3-ft.-long aluminum snouts. Instead of fences that fail to provide sufficient protection for fixtures near the piers that come up on the land side, Daniels created concrete vaults to house the fixtures that are topped with aluminum grating over a polycarbonate sheet. The 3/4-in. fiberglass shields anchored into the base concrete foundations eliminate glare, do not corrode and serve as storm surge breaks.

Fixtures and mounting brackets used in bridge lighting projects must be marine rated and corrosion resistant. "Whereas exterior building lighting presents some difficulties in finding the proper fixtures, about 90 percent of good exterior fixtures are eliminated for bridge use due to the necessity of a marine rating," explained Daniels. "Fixtures chosen for the causeway have less than 1/2-percent copper content. If water puddles, the metal rots away when it has significant copper content. So a special grading of low copper content was required, which eliminated 95 percent of the fixture choices. We used stainless-steel mounting brackets and marine-rated, anti-corrosion, high water-pressure gaskets."

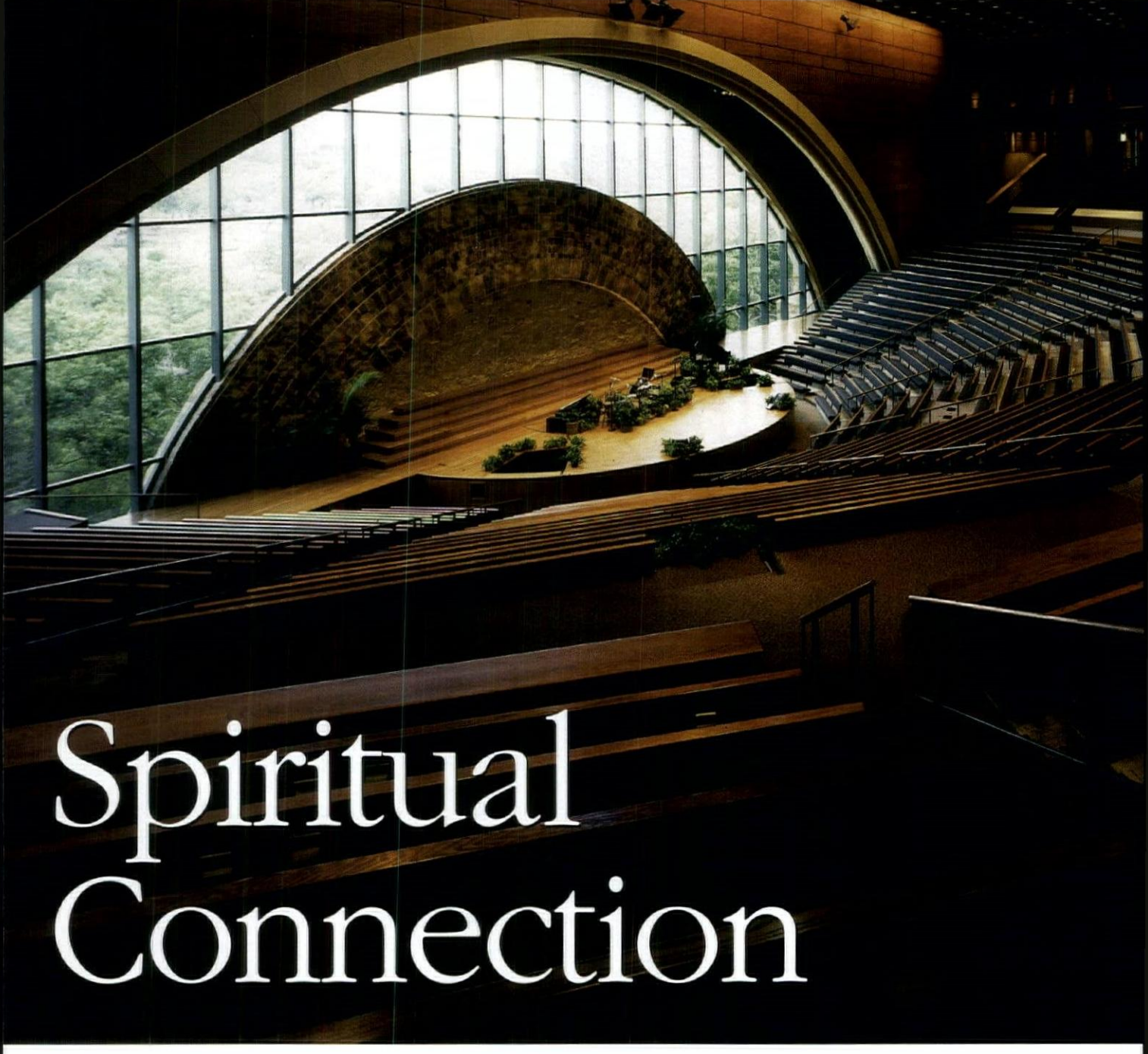
According to Daniels, this may be the first bridge designed with a 20,000-hour maintenance cycle. "Many bridge lighting designs don't have maintenance cycles, which can result in a costly nightmare for the local owners," he explained. "Replacing lamps or ballasts on a bridge is no easy matter. The use of trucks with snooper arms that reach over the side and underneath the structure can be a luxury the local city may not be able to afford. The alternative is to float a barge underneath the structure, anchor it and have a self-powered lift hoist the maintenance man up to the fixture for change outs. This procedure must be done for every single lamp. Needless to say, group relamping is a must. Our 20,000-hour maintenance design eliminates every other lamp changeout."

How did Daniels conceive the design for such a large structure? While some designers work with fixtures first to plan the design, Daniel tends to work in reverse. "We create Photoshop renderings of what we want the illuminated structure to look like and because it is computer-generated, I can fine-tune the look of the design," he said. "We go back and forth until it's right. After I work with the graphic designer to fashion how I want the image to look, then I engineer it to make it happen. When I install the actual lighting system, it generally looks better than the computer-generated version and the client is doubly pleased."

Not only was the client pleased, but each night, viewers of the MacArthur Causeway are pleasantly surprised when the magenta and blue necklace of light comes into view. ■

DETAILS

- **PROJECT** MacArthur Causeway
- **LOCATION** Miami, FL
- **CLIENT** Florida Department of Transportation, Port of Miami
- **PROJECT ENGINEER/ARCHITECT** Beisweinger, Hock & Associates—Dinesh Dabley and Francisco Narona
- **DESIGN ARCHITECT** Pei Cobb Freed & Partners
- **LIGHTING DESIGNER** Brilliant Lighting Design—Robert Daniels, IES
- **PHOTOGRAPHER** Robert Daniels
- **LIGHTING MANUFACTURERS** GE Lighting; WideLite; Insight; Special FX



Spiritual Connection

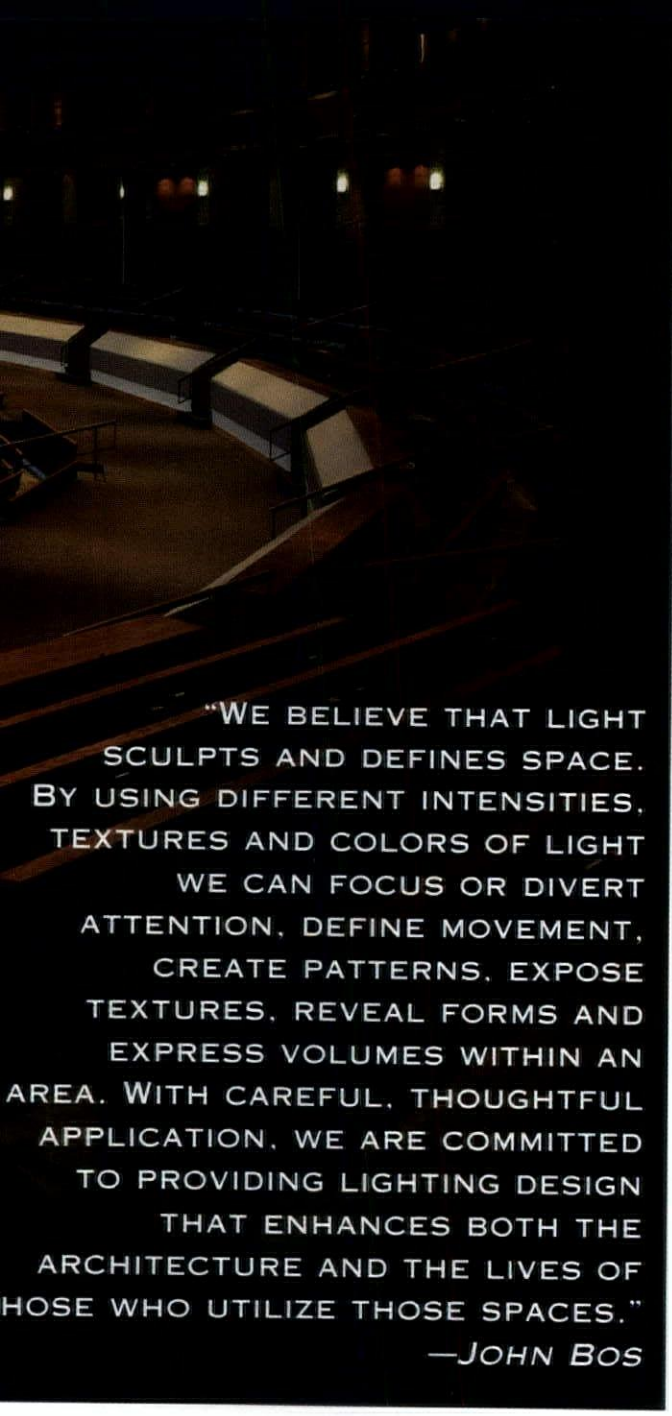
Lighting designer John Bos creates a lighting scheme that brings collective soul to an unconventional church

BY JEAN GORMAN, CONTRIBUTING EDITOR

"Something magical happened," said architect Tim Blonkvist, recalling the intricate series of events that influenced the design of the Riverbend Church in Austin, TX. Whether or not you believe in miracles, the sensitivity with which the new church was created suggests that divine inspiration may have been at play in its development. At the very least, the church stands as a testament to the power of the collaborative spirit among mortals.

Thanks to the vision of the church's pastor, Dr. Gerald Mann, the collective experience of the architects, lighting designers and engineers involved in its creation and a smattering of happy coincidences and acts of nature, the shape and size of the building, its role in the community and its position in the landscape expanded well beyond its initial scope as the design process unfolded. "The church's major outreach is not to traditional churchgoers," explained Blonkvist, a principal of Overland Partners Architects who was in charge of the project. "It aims to connect with what the church calls 'the four Bs'—the bruised, the battered, the bored and the beaten—people who have been turned off to life and the traditional church," he claimed.

According to Blonkvist, who collaborated closely on the project with Bob Shemwell, Rick Archer and other design principals of the San Antonio, TX-based architecture firm, the leaders of the church wanted their untraditional approach to connecting with people reflected in the design of their new building. "They didn't want it to look like a church with manmade icons and religious symbols inside," said Blonkvist.



"WE BELIEVE THAT LIGHT SCULPTS AND DEFINES SPACE. BY USING DIFFERENT INTENSITIES, TEXTURES AND COLORS OF LIGHT WE CAN FOCUS OR DIVERT ATTENTION, DEFINE MOVEMENT, CREATE PATTERNS, EXPOSE TEXTURES, REVEAL FORMS AND EXPRESS VOLUMES WITHIN AN AREA. WITH CAREFUL, THOUGHTFUL APPLICATION, WE ARE COMMITTED TO PROVIDING LIGHTING DESIGN THAT ENHANCES BOTH THE ARCHITECTURE AND THE LIVES OF HOSE WHO UTILIZE THOSE SPACES."
—*JOHN BOS*

LEFT: BANDS OF METAL HALIDE AND HALOGEN DOWNLIGHTS MOUNTED IN AN ALTERNATING RHYTHM ADDRESS THE NEED TO BALANCE THE COOL DAYLIGHT ENTERING THROUGH A MASSIVE 60-FT.-LONG ARCHED WINDOW WITH THE WARM LIGHT REQUIRED TO CREATE AN INVITING ATMOSPHERE WITHIN WHILE PRODUCING THE CORRECT COLOR TEMPERATURE RANGE FOR CAMERAS USED DURING WEEKLY TELEVISED WORSHIPS. GRADATED NEUTRAL-DENSITY FILTERING ON THE WINDOW REDUCES GLARE NEAR THE SANCTUARY, YET ALLOWS LIGHT TO PENETRATE DEEP INTO THE SPACE NEAR THE CEILING.

hey wanted a place for people to be educated and entertained, a mul-urpose auditorium space where people could come not only for nday worship but for concerts, theatrical performances, sym-onies or large meetings, too."

Originally, the plan was to add a rectangular addition to verbend's existing building, which the growing congregation had out-wn due, in part, to the success of the church's televised Sunday wor-ps. But after a trip to the Mediterranean, Dr. Mann returned with an elible impression of the amphitheaters he'd seen on his travels, which pired the architects' design direction. "He liked the idea of a place ere someone could go outside and speak to people, a place where ys and concerts could also be staged," said Andrew Douglas, the pro-t architect. "His directive was to create a place where people could see at God had made rather than what man had made."

PEN TO IDEAS

Although the idea of an open-air amphitheater was rendered impractical by the oppressive Texas heat, the architects knew that such a structure's semi-circular shape would be ideal for bringing large numbers of people close together, so they explored a scheme for an enclosed amphitheater. As they contemplated the shape of the building, the whisper of God's creation came into play. Driving back from a visit to the building's site, which is located on a plateau facing a bend in Austin's Town Lake, the stunning drop of a 75-ft. ravine and miles of gracefully rolling Texan hills beyond, the two architects were struck by a simultaneous epiphany. "Reflecting on the scene, we both came up with the same idea at the same time: To enclose the back of the proscenium with a massive glass wall that would allow a view to the hill country to the north," Blonkvist recalled. Other silent cues from the landscape and the unintended generosity from a local television viewer influenced the design of the building yet again: The double arch of Austin's Highway 360 bridge echoed by a rainbow that appeared after a rain during a church fundraising event served as the sources of inspiration for shaping the church's massive window as an arch. And a $2 million loan from a local businessman who was watching a televised worship when the news of plans for the new church was announced allowed for a balcony to be added to the structure during construction, expanding the size of the church from 2,800 seats to 4,500.

While the ambitious concept for the church, which cost $12 million and occupies 6,500 sq. ft., responded ideally to the church leaders' vision and the community's needs, it posed considerable challenges for lighting designer John Bos and a team from his firm, Bos Lighting Design. "Technically, there were a host of problems," said Bos, pointing out that daylight entering through the large arched window behind the sanctuary conflicted with the need for warm inviting light throughout the deep space and with the need to establish a quality of light that could be read as balanced by television cameras. "The daylight coming through the window from the north was about 6200K," he said, "yet we needed to introduce incandescent lamps at about 3000K to give pink tones to people's faces and allow them to look human. But the television cameras needed to see light with a color temperature spread of no more than 600K. As a result, we came up with a scheme that mixes color-specific metal halide and incandescent halogen lamps so that about half of the light is at 5200K and half is at 3000K, and we let the backlight go cool."

LIGHT & DAY

Housed in cylindrical fixtures mounted in rows below overhead catwalks and between acoustical baffles along the ceiling, ED28 metal halide lamps and PAR56 incandescents alternate in every other position to produce an even rhythm of ambient illumination that washes the space. "Rather than using large sources, we used lots of smaller sources to get a greater overlap of the beamspreads and to avoid creating an effect of blue and yellow stripes of light," said Bos. Light from each fixture overlaps with that of eight of its neighbors. Also to keep the level of illumination even throughout the space, which ranges from 56 ft. in height in front of the proscenium to 20 ft. in front of the balcony to 10 ft. at the door, the lighting designers shifted the wattage of the metal

A DIMMING SYSTEM ALLOWS THE METAL HALIDE SOURCES TO BE TURNED OFF AND THE LIGHT LEVEL OF THE INCANDESCENTS TO BE REDUCED FOR EVENING EVENTS. THEATRICAL CYCLORAMA FIXTURES ENHANCE THE WARM MAPLE WALLS AND THE STONE SUNRISE PUNCTUATING THE CENTER OF THE ARCHED WINDOW. ELLIPSOIDAL HALOGENS MOUNTED IN THE FLY SPACE BRING WARMTH TO THE SANCTUARY TO COUNTERACT THE DAYLIGHT ENTERING THROUGH THE WINDOW.

The 370 or so fixtures used throughout the space are co
nected to a dimming system, which can be adjusted to p
duce a maximum light level of about 68 fc during the day
balance with the level of daylight coming through the w
dow. At night, the metal halides are turned off, with
incandescents and fluorescents producing a light level
about 21 fc. The connected load for the building is 6W/sq.

The lighting of the Riverbend Church came
under budget at $250,000 and recently received an IESNA/IID
National Award of Merit.

halides from 175W at the stage to 100W at the balcony and that of the incandescents from 500W at the stage to 300W at the balcony. Triple-tube fluorescent lamps corrected to 3000K were used in conjunction with PAR38 incandescents under the balcony.

The architects and lighting designers also collaborated with a natural light expert, Mack Holder, to address issues of glare coming through the window during the day and to respond to the mirror-like reflections the blackened window would produce at night. After conducting numerous detailed computer studies, the designers opted to treat the window with gradated neutral-density coatings that would filter the daylight and change the tonal value of the window from the bottom to the top. The darker coatings at the bottom shield the light reflected from vegetation outside, reducing glare, while the lighter coatings at the top allow daylight to penetrate deep into the space. "We gained two camera stops with the filtering," said Bos. In addition, a scrim is lowered for evening events to counteract any mirrored reflections the darkened window would produce at night.

To introduce warmth and soften the cold daylight coming through the window in the proscenium area, the lighting designers mounted banks of incandescent wallwashers, mounted above a catwalk and fitted with lavender, yellow and light blue filters, to illuminate the maple wood proscenium facade. These are augmented by 40 theater projectors housing 575W halogens and are aimed to throw light on the bottom half of the maple wood walls surrounding the arched window.

DETAILS

- **PROJECT** The Riverbend Church
- **LOCATION** Austin, TX
- **OWNER** The Riverbend Church
- **ARCHITECT** Overland Partners; McKinney Architects
- **LIGHTING DESIGNER** Bos Lighting Design
- **NATURAL LIGHT CONSULTANT** Mack Holder
- **MEP ENGINEER** Lundy & Associates
- **THEATRICAL** WJHW
- **PHOTOGRAPHY** Paul Bardagjy
- **LIGHTING MANUFACTURERS** Day-Brite|Capri|Omega; Hydrel; Electronic Theatre Controls; Indy Lighting; Greenlee; Winona; Osram Sylvania; GE Lighting

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Wall Folio, Murano glass, (1x150 W hal.), two sizes,
design: C.A. Urbinati-Ricci / A. Vecchiato

Wall Hola, glass, (1x150 W hal.), two sizes,
design: Roberto and Ludovica Palomba

Wall Flat, glass, (1x60 W inc.), design: Piero Lissoni

Wall Shape 3, Murano glass, (1x100 W inc. or 1x150 W hal.),
design: C.A. Urbinati-Ricci / A. Vecchiato

Wall Bit, glass, (1x60 W inc.), design: Ferruccio Laviani

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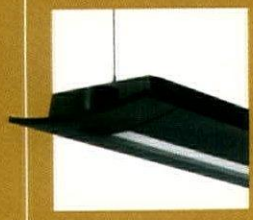
concealed cove
indirect



Ciros
pendant mounted
indirect/direct

Arcos & Arcos slots
pendant mounted
indirect

Wall X^a-56
wall mounted
asymmetric
indirect

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A 20-YEAR INDUSTRY PLAN FOR LIGHTING TECHNOLOGY

Vision 2020

THE LIGHTING TECHNOLOGY ROADMAP

OFFICE OF BUILDING TECHNOLOGY, STATE AND COMMUNITY PROGRAMS
ENERGY EFFICIENCY AND RENEWABLE ENERGY • U.S. DEPARTMENT OF ENERGY
FOR MORE INFORMATION, VISIT WWW.EREN.DOE.GOV/BUILDINGS/VISION2020

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CO-SPONSORS

The following associations have taken a lead role in developing the Lighting Technology Roadmap and are committed to its implementation.

- Illuminating Engineering Society of North America (IESNA)
- International Association of Lighting Designers (IALD)
- InterNational Association of Lighting Management Companies (NALMCO)
- National Association of Electrical Distributors (NAED)
- National Electrical Manufacturers Association (NEMA)
- National Electrical Manufacturers Representatives Association (NEMRA)
- National Electrical Contractors Association (NECA)
- National Association of Independent Lighting Distributors (NAILD)
- U.S. Department of Energy, Office of Building Technology, State and Community Programs

Opening New Frontiers for Lighting

It is impossible to imagine modern life without electric lighting. With the wide availability and affordability of today's lighting, people throughout much of the world are free to work, play, and learn virtually anywhere, anytime.

The flexibility of our waking hours, the richness of our information environments, the complexity of our visual tasks, and the range of our movement exceed anything our ancestors could have envisioned just over 120 years ago, in the days before Thomas Edison's carbon-filament lamp changed the world.

Continued innovation in lamps and other system components, as well as in design practices, have made lighting progressively more effective, efficient, and economical since Edison's time. Yet the Lighting Technology Roadmap anticipates developments in the next 20 years that may well dwarf the accomplishments of the past century.

A NEW INITIATIVE

The U.S. Department of Energy's Office of Building Technology, State and Community Programs (BTS) is facilitating a new industry-led initiative to develop a series of technolog roadmaps. The roadmaps identify key goals and strategies for differer areas of the building and equipmer industry. The Lighting Technology Roadmap, focusing on opportunitie in commercial lighting, is one of the first sponsored by BTS.

This roadmapping initiative is a fundamental component of the BTS strategic plan and will help to align government resources with the high-priority needs identified by industry. The roadmap will guide cooperation among public and private researchers, lighting companies, and other State and Federa offices to help the lighting industry achieve its long-term vision.

EXECUTIVE SUMMARY

RATEGIES FOR ACHIEVING IE LIGHTING VISION

rket Transformation Strategies

Develop clear definitions and standards for lighting quality.

ncrease demand for high-quality ighting solutions by quantifying, demonstrating, and promoting life-cycle benefits to broad audiences.

Strengthen industry education and credential lighting professionals.

Accelerate the market penetration of advanced lighting technologies. and systems, by providing incentives for R&D and reducing barriers inherent n today's specification and distribu-ion methods.

chnology Development Strategies

Develop advanced source and ballast technologies that enhance quality, efficiency, and cost effectiveness.

Develop lighting controls with high levels of intelligence, interface capabilities, multiple levels of control, and ease of configuration.

Develop luminaires and systems that enhance the quality and flexibility of light delivery.

SHAPING OUR BUILT ENVIRONMENTS

A remarkable confluence of emerging technologies can spell great improvements in our ability to harness light efficiently and effectively, to extend the reach and power of human vision, and to dynamically monitor and shape our built environments to suit specific purposes and preferences. Advances on diverse technology fronts promise to drive down the costs and multiply the capabilities of microchips, lasers, and photovoltaics, opening the way to entirely new levels of performance in sensors and controls. Also on the horizon are innovative materials, high-efficiency light sources, breakthroughs in biotechnologies and chemical sciences, and ever more powerful methods of system modeling and integration.

Advanced technologies will, in turn, enable advanced design and engineering approaches. Starting in the commercial building sector, but later moving into the residential sector as well, we will see growing sophistication in the design of lighting and other building systems within an integrated, "whole buildings" framework. The "whole buildings" approach will optimally use both human-made and natural systems to provide efficient, high-quality lighting, heating, cooling, ventilation, and information exchange.

The result? Tomorrow's buildings will provide unprecedented levels of comfort, productivity, flexibility, and well-being for occupants, while reducing energy use and other impacts on the natural environment.

VISION STATEMENT

In 2020, lighting systems in buildings and other applications will:

- Enhance the performance and well-being of people
- Adapt easily to the changing needs of any user
- Use all sources of light efficiently and effectively
- Function as true systems, fully integrated with other systems (rather than as collections of independent components)
- Create minimal impacts on the environment during their manufacturing, installation, maintenance, operations, and disposal

As a result, people will understand, value, and utilize the tangible, personal benefits provided by these lighting systems.

DETERMINING PRIORITIES

Vision 2020: The Lighting Technology Roadmap describes an exciting future for lighting in the coming decades. It represents nearly two years of work by 180 organizations representing a broad range of lighting manufacturers and professionals, as well as members of the academic, government, and research communities. Nearly 100 participants contributed to brainstorming workshops, reaching general consensus on a vision for the future of lighting and identifying possible activities for achieving it. Another 201 individuals cast their votes on which strategies and activities should receive the highest priority. (High-priority strategies and activities are presented on pages 12 to 17 of this document.) Votes were solicited and collated by the Department of Energy, Office of Building Technology, State and Community Programs (BTS), which has facilitated the development of the Lighting Vision and the Technology Roadmap.

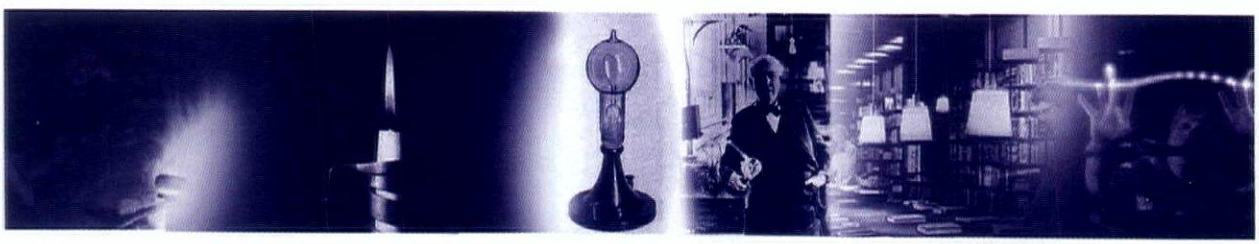
Eight lighting industry associations have sponsored the vision and roadmap process: the Illuminating Engineering Society of North America (IESNA), the International Association of Lighting Designers (IALD), the National Association of Electrical Distributors (NAED), the National Electrical Manufacturers Association (NEMA), the National Electrical Manufacturers Representatives Association (NEMRA), the National Electrical Contractors Association (NECA), the National Association of Independent Lighting Distributors (NAILD), and the InterNational Association of Lighting Management Companies (NALMCO). These associations have expressed their commitment to the ongoing effort to implement the Technology Roadmap priorities.

ADDRESSING THE BARRIERS

Both market-related and technology barriers need to be addressed to realize the Lighting Vision. One key barrier is the current weakness in the market for innovative lighting solutions. A specific challenge is to demonstrate how life-cycle benefits often make high-quality lighting systems an attractive and economical choice, even when their initial purchase costs are higher than those for other options.

The Technology Roadmap describes seven strategies for moving forward. Four strategies address the challenges of market transformation, with activities targeted for implementation in the short (less than three years) to medium (three to 10 years) term. The remaining three strategies relate to lighting technology development. These strategies target attributes that are likely to be valued in tomorrow's sources, ballasts, lighting controls, luminaires, and systems. Virtually all the desired attributes are judged to be technically achievable in the short (less than three years) to medium (three to 10 years) term.

In 20 years, the state of lighting technologies and markets may well be considerably different than that described in the Lighting Vision and the Technology Roadmap. Yet to the extent that their work inspires increased innovation, risk-taking, investment, and collaboration in the industry, the lighting manufacturers and professionals who developed this vision and roadmap will have helped to shape that future.



From the cave dwellers through much of the 19th century, humans had to rely on fire to extend the light of the day. Thomas Edison's 1879 invention of the carbon-filament lamp and its electric supply system changed everything. Steady advances in lamps, ballasts, fixtures, controls, and other lighting technologies made electric lighting progressively more affordable, available, and convenient throughout the 20th century.

INTRODUCTION

Lighting accounts for nearly one-sixth (approximately $40 billion) of the total annual electricity use in the United States.[1] Advances in lighting, particularly the use of high-efficiency lighting sources, have the potential to reduce U.S. electricity bills by billions of dollars annually and to reduce emissions of carbon dioxide and air pollutants into our environment.

A BROADLY REPRESENTATIVE INITIATIVE

Leaders from across the lighting industry—together with the academic and research communities—have developed Vision 2020: The Lighting Technology Roadmap. This industry-defined public document charts a future course for lighting that can meet the demands of tomorrow's commercial buildings and the needs of the people who design, build, own, and occupy them.

The Technology Roadmap is intended to provide clear guidance to both the government and private sector in planning future investments and initiatives. One aim: to accelerate the development of new lighting technology solutions and business practices to meet the challenges of today's and tomorrow's commercial buildings.

The roadmap will serve as a resource for government to use in appropriately aligning its activities with industry priorities and as a framework for cooperative initiatives between industry and government. Industry associations will be able to use the roadmap to develop communications materials and target key market transformation activities. Additionally, private companies may use the roadmap to identify priority funding for projects and products that will contribute to achieving the Lighting Vision.

Above all, the roadmap serves as the starting point for future-focused dialogue among lighting industry leaders, researchers, and government. Continued collaboration—including periodic updating of the vision and roadmap—will be key to realizing the Lighting Vision.

1 Energy Information Administration, Annual Energy Outlook 2000

STEPS IN THE ROADMAP DEVELOPMENT PROCESS

LIGHTING EXECUTIVE FORUM (VISIONING WORKSHOP)

When and where: September 1998 at the Robert L. Preger Intelligent Workplace, Carnegie Mellon University, Pittsburgh, Pennsylvania
Who participated: 20 top executives from all sectors of the lighting industry
Challenge: Explore the vast possibilities for improved lighting technologies, practices, and markets in the next 20 years
Results included: First draft of the Lighting Vision statement and "big picture" goals for the industry

ROADMAPPING WORKSHOP I

When and where: December 1998 in Tucson, Arizona
Who participated: More than 60 lighting industry stakeholders
Challenge: Identify potential market and technology barriers to the Lighting Vision, and brainstorm ways to overcome the barriers
Results included: Final version of the Lighting Vision statement and definition of 190 possible market transformation activities

ROADMAPPING WORKSHOP II

When and where: July 1999 at the Battelle Breakthrough Center, Columbus, Ohio
Who participated: A dozen experts representing lighting and building-related disciplines
Challenge: Identify forms, functions, and specific technologies that extend from what is known today to the imaginable of the envisioned future (2020 timeframe)
Results included: Specific technical attributes and capabilities that lighting systems will need over the next 20 years

VOTING ON PRIORITIES

Via the Internet, 201 stakeholders of the lighting industry voted on which of the market-transformation activities and future attributes of lighting technologies can have the greatest impact on achieving the Lighting Vision. These voters represented a broad cross-section of the lighting industry, including manufacturers (37%), lighting designers (20%), engineers (11%), government (6%), architects (4%), manufacturers' representatives (4%), nonprofits (4%), suppliers (1%), and other stakeholders (13%). Voting results formed the basis for the strategies and high-priority actions defined in this Technology Roadmap.

"This Roadmap will create a common point of clarity and direction, and through this effort we can, by example, become the agents of change for the entire construction industry."

— Dennis W. Clough
Team Leader
Vision 2020: The Lighting Technology Roadmap

VISION 2020: THE LIGHTING INDUSTRY VISION

While the future of lighting depends, in large part, on developments no one can predict, significant market and technology trends are already in evidence. The developers of the Lighting Vision explored these trends and their implications for lighting, and crafted a vision that can create new opportunities for lighting based on these trends.

On the marketplace side, developers of the Lighting Vision foresee growing demand for advanced lighting systems by businesses, building owners and managers, and end users:

- In businesses, advanced lighting will support the relentless drive to increase productivity and value-creation, and to reduce costs. Tomorrow's lighting will respond to the significant changes now under way in the nature of work and, in turn, in commercial building design and management. For example, lighting of the future will enable more effective use of space for multitasking, so businesses can adapt workplaces currently designed for individualized, manual, and paper-based operations into an environment that promotes teamwork, shared resources, and electronic processes. In the future, high-quality lighting systems increasingly will be valued for their ability to improve employee productivity, employee retention, and quality control, particularly as work becomes ever-more dependent on information access and interconnectivity. Businesses and individuals also will gain greater understanding of how advanced lighting solutions can improve health, safety, and security in the workplace, as well as yield significant bottom-line savings by reducing energy consumption.
- Advances in lighting will help answer the needs of building owners and managers for the highest possible return on capital investments. Efficient, intelligent lighting systems—especially those networked in a "whole buildings" context with other building systems—will enable managers to exercise greater levels of control over building functions, minimizing operations, maintenance, and energy costs. More important, advanced lighting

VISION STATEMENT

In 2020, lighting systems in buildings and other applications will:

- Enhance the performance and well-being of people
- Adapt easily to the changing needs of any user
- Use all sources of light efficiently and effectively
- Function as true systems, fully integrated with other systems (rather than as collections of independent components)
- Create minimal impacts on the environment during their manufacturing, installation, maintenance, operations, and disposal

As a result, people will understand, value, and utilize the tangible, personal benefits provided by these lighting systems.

BARRIERS

The speed of technology development and product innovation in lighting is exceptionally slow when compared with that in other industries. Emphasis on low-first-cost in lighting purchases, and in commercial construction purchases in general, contributes to a "vicious cycle" that slows the development and adoption of improved lighting solutions.

MARKET-RELATED AND TECHNOLOGY BARRIERS

In the Lighting Vision, lighting professionals have articulated a bold view of their industry's future over the next 20 years. Significant challenges lie ahead in making this vision a reality.

One set of challenges will require market transformation, to build demand for advanced lighting products and systems and to gain a deeper understanding of how consumers and purchasers will value new lighting capabilities. Another set of challenges are technical, requiring increased levels of investment in science and technology, including basic and applied research, product development, and demonstrations.

will provide the high-performance, aesthetically pleasing environments that increasingly will be demanded by tenants, and will help owners manage properties to their greatest economic potential.

- In the consumer market, advanced lighting will help fulfill our appetite for comfort, convenience, and instant information and connectivity. Whether at work or at play, as consumers we will demand an increased level of personalized control over the function and aesthetics of our lighting. Sensors and controls in future lighting systems will provide us with new levels of information about our environment, and will allow us to shape that environment to enhance our creativity and productivity.

On the technology side, the developers of the Lighting Vision anticipate a flood of scientific and technology developments that will make lighting an increasingly more effective, efficient, and dynamically responsive contributor to our built environments. Advanced lighting systems will exploit the capabilities of more powerful and cost-effective sensors and controls, wireless connectivity, high-efficiency light sources, breakthroughs in biotechnology and chemistry, innovative high-performance materials, sophisticated systems integration and modeling capabilities, and many other new and emerging technologies. Lighting design will increasingly be done in an integrated, "whole buildings" context that optimizes human-made and natural systems (such as daylight) to provide efficient, high-quality lighting, heating, cooling, ventilation, and information exchange. Greater emphasis on ongoing education for lighting professionals, as well as outreach to consumers, will be needed to maximize the value and opportunities afforded by fast-changing technologies.

Good lighting contributes to the productivity of businesses, the health and well-being of individuals, and the energy efficiency of buildings.

"The results of this effort will offer major benefits to both our industry and the workplace."

— William J. McCarron
Vice President of Marketing
Siemens Energy & Automation, Inc.

MARKET TRANSFORMATION CHALLENGES

A major factor threatening timely realization of the Lighting Vision is the traditionally low rate of technology development and product innovation in the lighting and building industries.

In any industry, new products gain market acceptance over time by demonstrating a value superior to that of competing products. Yet product cycles have been exceptionally long in the lighting industry. The commercial building marketplace, in particular, has been slow to accept new lighting products and technologies, and the building industry has invested considerably less than most other industries in research, development, and demonstration. A study done in 1994, for example, found that U.S. private investment in construction research and development was only 0.5 percent of sales, while the rate of private investment for U.S. industry as a whole was 3.5 percent.

One result of these long product cycles can be seen in the catalogs of today's lamp manufacturers. A typical manufacturer's catalog may carry 3,000 products, many of which have been available for decades.

Today, there is negligible demand for innovation in commercial lighting, a situation that is worsened by the unusually complex distribution channel serving the construction industry (see illustration, page 11).

Lighting systems are often purchased by a general or electrical contractor on behalf of the building owner or manager. While their purchases may be influenced by the recommendations of an architect or lighting specifier, most contractors put an overriding focus on low-first-cost lighting. Indeed, contractors may often "value-engineer" lighting, finding lower-cost options to substitute for the equipment selected by the architect or lighting specifier. The end user typically has little or no voice in lighting selection and often lacks awareness of the options available. In fact, an end user who seeks out information is likely to get conflicting recommendations from advisors in different parts of the distribution channel.

Because of the market focus on low-first-cost solutions, lighting equipment manufacturers are often pitted against each other to supply the least expensive system that will pass standards set by the installer, rather than the end user. As a result, lighting profit margins are increasingly constrained, limiting the industry's ability to invest in technology and product development. Further, since new products are accepted very slowly, production volumes of high-quality lighting solutions often remain below the critical mass needed to achieve economies of scale. As a result, high-quality lighting products stay pegged in high-priced niches, even though their market benefits and applications are potentially very broad.

In short, innovation in the commercial lighting marketplace is being neither strongly pulled by customer demand nor strongly pushed by industry investment. Transforming the dynamics of this marketplace—moving away from low-first-cost decisions to valuations based on life-cycle benefits—will be critical to achieving the Lighting Vision.

The overriding market-related barrier to the Lighting Vision is the lack of a strong business case for advanced lighting that can drive end-user demand. Many case studies point to the advantages of high-quality lighting in improving productivity, employee retention, error-reduction, and workplace safety; in attracting retail customers and improving retail sales; and in reducing energy consumption and other operating and maintenance costs. Yet these benefits have not yet been adequately documented, measured, and communicated to make a compelling case to tenants and building owners. Tenants and building owners will be key in driving demand for higher-quality lighting, where life-cycle returns justify the greater initial cost of their purchase and installation. Architects, lighting specifiers, lighting manufacturers, and industry trade associations all will have pivotal roles in demonstrating and communicating these life-cycle benefits, and many will require ongoing education on advanced lighting technologies and design standards to perform these roles effectively.

TECHNOLOGY BARRIERS TO OVERCOME

- Lack of standardization in current lighting control technologies and systems
- Need for more sophisticated control capabilities
- Need for better metrics to evaluate the quality and performance of products and technologies
- Lack of effective design tools and practices for integrating lighting into whole building design
- Need for higher-efficiency lighting sources, including reduced-mercury sources
- Need for new ballasts to support advanced lamp technologies
- Need for increased portability and flexibility in luminaires

"Educated and informed end users will drive demand for lighting products that deliver desired features and benefits. Only then will lighting function take precedence over price. Effective use of the Internet and other information channels will be key in this transformation."

— Henry P. Bergson
President
NEMRA

TECHNOLOGY CHALLENGES

The industry participants who crafted the Lighting Vision and Technology Roadmap identified several key trends that will affect commercial activities and buildings and, in turn, impose new demands on lighting technologies.

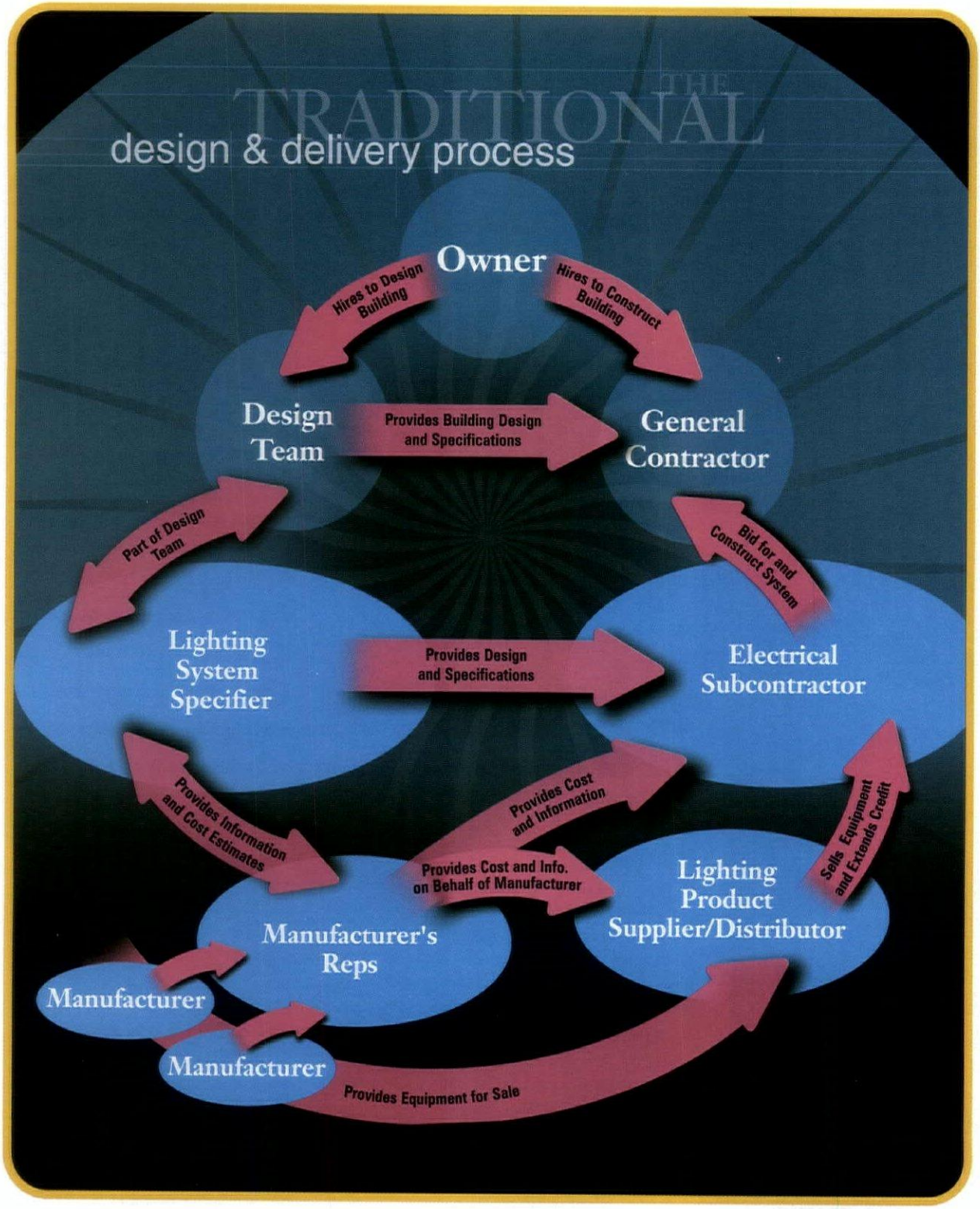
Commercial lighting systems will be challenged to adapt to the changing nature of work, including the increase in paperless, electronic-based tasks; the growing prevalence of team-based activities; and the ongoing reorganization and reconfiguration of many business functions.

Another trend affecting lighting will be the continued drive to enhance human productivity, creativity, and well-being. High-quality lighting that can measurably contribute to workplace productivity is expected to be in growing demand. In addition, there will be increased requirements for lighting systems to function as a fully integrated part of the total commercial building, raising the need for more sophisticated lighting control capabilities and for building design approaches that make optimal use of both natural and human-made systems.

The Technology Roadmap strategies define the attributes of future lighting components and systems that can respond effectively to these trends. Specifically, the strategies identify features and functions of tomorrow's sources and ballasts, lighting controls, and luminaires and systems.

A central challenge for future lighting systems is to allow end-user control of light intensity, color, color temperature, quality, and distribution within the space. Enabling control technologies need to be easy, intuitive, robust, and simple, and must be integrated with interoperable building-level controls.

Commercial lighting purchases are usually made by the general or electrical contractor on a low-first-cost basis, on behalf of the building owner or operator. End users are unaware of the benefits of high-quality lighting solutions, and they have little impact on purchasing decisions. Further, since lighting is one of the last systems to be installed in a building, it may be "value engineered" to help meet total construction budget constraints, even when a higher-quality system is initially specified.


THE TRADITIONAL
design & delivery process
Owner
Hires to Design Building
Hires to Construct Building
Design Team
Provides Building Design and Specifications
General Contractor
Part of Design Team
Bid for and Construct System
Lighting System Specifier
Provides Design and Specifications
Electrical Subcontractor
Provides Information and Cost Estimates
Provides Cost and Information
Provides Cost and Info. on Behalf of Manufacturer
Sells Equipment and Extends Credit
Manufacturer's Reps
Lighting Product Supplier/Distributor
Manufacturer
Manufacturer
Provides Equipment for Sale

STRATEGIES

Achieving the Lighting Vision will require strategies to transform the lighting marketplace, encouraging more purchasers to consider life-cycle benefits as well as low first-cost. Such a change in purchasing decisions will, in turn, create demand for innovative lighting solutions and drive higher levels of investment in lighting research and development.

Specifically, four market transformation strategies and three technology development strategies emerged from the vision and roadmapping process. These strategies are supported by a series of high-priority activities that will directly lead to their fulfillment. Virtually all of these activities and technology capabilities were judged to be achievable in the short (less than three years) to medium (three to 10 years) term.

VOTING PROFILE

A total of 201 lighting stakeholders cast their votes to select the high-priority activities identified in this Technology Roadmap. Voters included:

- Manufacturers (37%)
- Lighting designers (20%)
- Engineers (11%)
- Government (6%)
- Architects (4%)
- Manufacturers' representatives (4%)
- Nonprofits (4%)
- Suppliers (1%)
- Other stakeholders (13%)

Detailed voting results are posted on the Lighting Technology Roadmap Web site: www.eren.doe.gov/buildings/vision2020

MARKET TRANSFORMATION STRATEGIES

S Short—Less than 3 years
M Medium—3 to 10 years
L Long—More than 10 years

MARKET TRANSFORMATION

STRATEGY 1—Develop clear definitions and standards for lighting quality

Activity	Timeframe
✔ Develop a uniform set of performance specifications for lighting systems.	S M
✔ Create industry-standard formats for energy and economics data for use across the many available software packages.	M
• Increase enforcement of ASHRAE/IESNA Standard 90.1-1989 and adoption of ASHRAE/IESNA Standard 90.1-1999.	S
• Determine objective definitions and metrics of lighting quality.	S M
• Support and conduct third-party evaluation of integrated lighting system design and application.	S M
• Incorporate requirements for environmental sensitivity for lighting systems (such as daylight use) into the existing code structure.	M

Note: Checkmarks indicate the activities that ranked #1 in their respective category from the internet voting. For detailed voting results for all categories, visit the Lighting Roadmap Web site.

MARKET TRANSFORMATION

STRATEGY 2—Increase demand for high-quality lighting solutions by quantifying, demonstrating, and promoting life-cycle benefits to broad audiences

Activity	Timeframe
✔ Increase scientific knowledge of how lighting parameters impact human psychology, health, and productivity.	M
✔ Maintain nonpartisan lighting centers and laboratories around the country where innovative lighting technologies can be demonstrated.	M
✔ Conduct educational forums for end users about the effects of lighting on people and their activities.	S
• Identify real customer needs through needs assessments and focus groups.	S
• Determine unique lighting characteristics and needs for specific environments (e.g., hospital, retail, office, restaurant).	M
• Use work performance research to help make the marketing of quality lighting more effective, as with ergonomic furniture.	M
• Conduct regional light fairs/expositions to showcase innovative lighting technologies.	S
• Develop a marketing campaign promoting quality lighting to the general public.	S
• Increase use of government buildings to demonstrate innovative technologies.	S M
• Increase publicity on the results of collaborative design and construction projects.	S M

MARKET TRANSFORMATION

STRATEGY 3—Strengthen industry education and credential lighting professionals

Activity	Timeframe
✔ Create educational programs on the design, installation, and use of lighting controls.	S
✔ Improved education on daylighting, including simple rules of thumb for architects.	S
• Provide training to product sales and distribution professionals about life-cycle cost analysis and the effects of lighting on people.	S
• Increase incorporation of NCQLP and CLMC certification requirements into Request for Proposal and Request for Quote language for building construction projects and energy-saving performance contracts.	S
• Establish design assistance teams to teach others how to better integrate lighting into overall building design and how to maximize daylighting.	S M
• Increase use of the Internet to provide information on research, demonstration, and regulatory activities.	S

(S) Short—Less than 3 years
(M) Medium—3 to 10 years
(L) Long—More than 10 years

MARKET TRANSFORMATION

STRATEGY 4—Accelerate the market penetration of advanced lighting technologies and systems, by providing incentives for R&D and reducing barriers inherent in today's specification and distribution methods

Activity	Timeframe
✔ Continue to develop rebate programs, coupled with public information programs, to transform the market for energy-efficient technologies.	S
• Encourage manufacturers to develop new innovative and energy-efficient technologies through public/private programs.	S M
• Create new Federal and State tax investment credits that encourage manufacturers and others to increase funding for lighting research.	M
• Create supplemental construction project funding for the purchase of innovative lighting products (through government or manufacturer efforts).	S M
• Lobby Congress to allow longer-term funding commitments, rather than annual funding, for fundamental research programs.	M
• Host stakeholder roundtables, focusing on distribution channels and other issues affecting technology market penetration.	S M

Note: Checkmarks indicate the activities that ranked #1 in their respective category from the internet voting. For detailed voting results for all categories, visit the Lighting Roadmap Web site.

"Like fresh air and clean water, good lighting adds much to the quality of life but is taken for granted. The Vision 2020 program will help to raise awareness of the importance of good lighting."

— Ron Lewis
Director of Information Resources
Lighting Corporation of America
Chairman, NEMA Lighting Systems Division

TECHNOLOGY DEVELOPMENT STRATEGIES

TECHNOLOGY DEVELOPMENT

STRATEGY 5—Develop advanced source and ballast technologies that enhance quality, efficiency, and cost effectiveness

Attribute/Capability	Timeframe
✔ Achieve dimmability that still maintains energy efficiency, color, and lamp life.	S M
✔ Extend lamp life (less turnover).	M
✔ Develop low-cost electronic ballasts for compact fluorescent lamps (CFLs).	S
✔ Develop point source for optical fibers and pipes (high efficiency).	S M
✔ Create advanced solid-state structures such as LEDs, LEPs, and ceramics.	M
• Maintain color throughout lamp life and from lamp to lamp.	M
• Increase efficacy: greater than 100 lumens per watt at high CRI (*80 CRI).	M
• For fluorescent lamps, develop two-photon phosphor technologies with efficiencies approaching 200 lumens per watt with CRI greater than 90.	M L
• For incandescent lamps, improve IR films to increase efficiency (50 to 100+ lumens per watt).	M
• For incandescent lamps, improve efficiency of incandescing filaments by increasing the emissivity in the visible range (+10% to 15% efficacy) and increasing the temperature capabilities of these new materials (+25% to 30% efficacy).	M
• For incandescent lamps, develop low-cost coatings to increase efficiencies from the current level of 20 lumens per watt to 30 lumens per watt.	M
• Develop improved design tools that incorporate daylighting concepts.	S M
• Develop toxic-free lamps and ballasts.	M
• Develop electrodeless metal halide technology, replacing mercury with xenon.	M
• Develop new geometrical optics, efficient packaging, and efficient light distribution systems.	M
• Create area sources (thin, flat panels).	M
• Redesign ballasts and conduct materials research to solve the lumen depreciation/color shift problem that accompanies electrode degradation.	M
• Develop new phosphor materials, electrode materials, and advanced ballast designs to produce gas discharges with quantum efficiencies greater than 1.5.	M
• Develop universal ballasts.	S M

(S) Short—Less than 3 years
(M) Medium—3 to 10 years
(L) Long—More than 10 years

TECHNOLOGY DEVELOPMENT

STRATEGY 6—Develop lighting controls with high levels of intelligence, interface capabilities, multiple levels of control, and ease of configuration

Attribute/Capability	Timeframe
✔ Enable easy installation (e.g., self-configuring and friendly to non-experts).	S
✔ Develop controls that are self-teaching, intuitive, easy to use.	S
✔ Develop universal control and communication protocols for component interconnection (such as BACnet or Echelon).	M
• Create a dialogue with energy management companies and lighting control industry in an effort to develop simple, easy-to-use controls.	S M
• Incorporate anticipatory logic so systems learn and adapt to user preference.	M
• Sense multiple inputs to configure and define lighting environments to user (color, room temperature, user temperature, user mood, eyesight of user, occupancy of room, motion, activity type, time of day, daylight levels).	M L
• Allow ease of programming by time of day and date.	S
• Improve robustness (e.g., non-volatile memory).	S M
• Establish interactive linkage between the lighting, HVAC, and other system controls.	M
• Provide some control at building level (range of levels, override).	S
• Develop a universal building interface (remote control and monitoring) for load shedding, optimization of lighting/heat, preventive maintenance.	M
• For public spaces, develop control systems that accommodate multiple uses of the space.	S
• Develop control systems that serve emergency-response needs.	S
• Develop control systems that monitor status of settings.	S

Note: Checkmarks indicate the activities that ranked #1 in their respective category from the internet voting. For detailed voting results for all categories, visit the Lighting Roadmap Web site.

TECHNOLOGY DEVELOPMENT

STRATEGY 7—Develop luminaires and systems that enhance the quality and flexibility of light delivery

Attribute/Capability	Timeframe
✔ Develop and utilize compatibility protocol to support "plug and play" (software and hardware).	M
✔ Utilize positioning and control to allow more effective task lighting.	S
✔ Develop combined light source/reflector panel.	M
• Achieve increased/variable reflectivity.	M
• Develop materials that support multiple functions (e.g., reflect light and absorb sound).	M
• Develop configurable reflectors.	M
• Enable users to easily adjust quantity and direction of light from set location (e.g., adjustable louvers, configurable reflector/diffuser).	M
• Develop smart fixtures that communicate with the control system, have intuitive learning capabilities, and perform diagnostics to enable preventive maintenance.	M
• Develop expressive lighting that enhances psychological well-being.	S M
• Achieve foolproof installation and simplified operations.	S M
• Develop systems that capture daylight for later transmission and distribution.	M
• Support easy movement of fixtures within a space.	S

A GLIMPSE OF THE (TECHNICALLY POSSIBLE) FUTURE

By 2003... Lighting systems will exhibit increased flexibility, using a single universal protocol for component interconnection. System controls will learn and adapt to user preferences, ultimately becoming capable of anticipating user needs. Controls will be robust, easily upgradable, and easily commissioned. Lighting sources will have increased dimming abilities, and a specialized reduced-mercury metal halide source will come to the market. Luminaires will be easy to relocate in the workspace through "plug-and-play" technology.

By 2010... Lighting systems will have capabilities unlike anything before. Luminaires will become smarter and more integrated, communicating with the control system, performing self-diagnostics, and enabling preventive maintenance. New materials will make reflectors configurable and more integrated with the light source. Microelectronics will show up in smaller, more flexible ballasts, and sensors will provide multiple inputs to define the lighting environment for users. Controls will work with the larger building management system to optimize use of daylighting, thermal load management, preventive maintenance, and demand load shedding. Highly efficient long-life sources, including solid-state LEDs and organic light-emitting polymers, will become available in the market. Fluorescent sources will reach efficiencies approaching 200 lumens per watt while maintaining a high color rendition index through the use of new two-photon phosphor coatings. Universal ballasts will increase flexibility of the systems, and low-cost electronic ballasts will make compact fluorescent lamps as common in America's homes as they are in the workplace.

By 2020... Design of building systems will optimally combine both natural and human-made systems to shape the indoor climate. Technology will be available to capture daylight for later transmission and distribution. Programmable flat-panel luminaires will create theatrical effects that are currently unknown. The attributes of this light will be manipulated by advanced control systems. Highly efficient, reduced-mercury fluorescent sources will come to market, while incandescent lamps will see new life through advanced materials that will raise their efficiency to 60 lumens per watt.

NEXT STEPS

Vision 2020: The Lighting Technology Roadmap outlines a view of where the lighting industry is today, a vision of where its stakeholders want to go tomorrow, and strategies on how to get there. It provides guidance to both government and industry on the direction of future activities. It offers a framework for greater collaboration across the industry in creating new market opportunities and innovative technologies, and provides guidance for the Department of Energy and other agencies in planning their activities and in forming research and development partnerships with industry.

The Technology Roadmap intentionally excludes detailed implementation approaches. These will be jointly developed between government and industry as the Technology Roadmap's strategies are analyzed and enriched. One early step in the implementation phase will be to investigate existing efforts already under way and determine how these might be leveraged to further the Lighting Vision and to avoid duplication of efforts.

Feedback on the Technology Roadmap is welcome. In particular, the sponsoring organizations would welcome inputs on which of the identified activities most directly relate to your organization's goals and needs, and whether a respresentative of your organization would want to become an active participant in implementing these activities. To become involved in the implementation process, contact the sponsoring association of which you're a member, or contact:

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ACKNOWLEDGEMENTS

A NOTE FROM...
Dennis W. Clough, Team Leader
Vision 2020: The Lighting
Technology Roadmap

As the Department of Energy's Team Leader for the development of Vision 2020: The Lighting Technology Roadmap, I have met and worked with literally hundreds of lighting professionals. Each of them has helped me better understand the many facets and intricacies of the lighting industry. These professionals have contributed to a process whose result will serve the government and industry for many years to come.

I would like to recognize three people especially:

Norm Grimshaw, Vice President of Technical Relations for Advance Transformer Company, spent many hours with me to ensure I understood the "real world" complexities of the industry. He has also been one of the Lighting Roadmap's most vocal and active advocates, consistently encouraging his colleagues and peers to engage in this important process.

Carol Jones, Senior Research Scientist with Pacific Northwest National Laboratory, introduced me to many of the industry's key players early in the roadmapping process, which helped make our Executive Forum, and ultimately the entire process, a success.

Ron Lewis, Director of Information Resources for Lighting Corporation of America and Chair of NEMA's Lighting Systems Division, has been the model change agent for his industry. His forethought, insight, and integrative abilities moved this process to a level that would have been unattainable without him.

Thank you so much for your help and guidance.

I would like to thank Battelle, Public Solutions, Inc., and What Box? Communications for their hard work with our Executive Forum and three roadmapping workshops, and thanks to Energetics, Inc., and Brandegee, Inc., for their support in the development, writing, and design of Vision 2020: The Lighting Technology Roadmap.

I would also like to thank the eight sponsoring professional associations, which helped us to get a wide representation of the entire industry engaged in this process. And finally, thank you to the 170 companies and organizations that actively participated in the development of the technology roadmap:

Available Light
Advance Transformer Company
Advanced Lighting Technologies
Alamo Lighting
Alliance to Save Energy
Armstrong World Industries
Auerbach & Glasgow
AVCA Corporation
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(continued on next page)

LIGHTING WEB SITE

For up-to-date information on implementation, refer to the Lighting Roadmap Web site at **www.eren.doe.gov/buildings/vision2020**

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HOME REMEDIES—RESIDENTIAL DESIGN

BY JEFF BROWN, IALD

While the specific design approach to lighting spaces used for day-to-day living vastly differs from those used for working, shopping, entertainment and the like, the methodology is pretty much the same. One needs to develop some general lighting guidelines and then work on a space-by-space basis to determine specific lighting design criteria with enough latitude for a personal artistic touch.

That said, the following is an index of general guidelines with some examples of how these guidelines have been implemented in a variety of residential spaces.

Light Sources. Electric light sources used in the home should be in the 2700K-3000K color temperature range with high color-rendering qualities in the 80 or better CRI range. If possible, have all similar lamp types provided by the same manufacturer to minimize inherent color, beam shape and output differences that are visually apparent between manufacturers.

Introducing daylight into the space is not only energy efficient, but allows the homeowner a much-needed connection to the outside. Since daylight has a significant impact on interior spaces, the size, shape, type and placement of windows and skylights should be a part of the lighting design as well as the architectural design. Note that with daylight there is a significant difference between "warm" direct sunlight and "cool" skylight. Both have UV components that can be damaging to sensitive artwork, woods, some fabrics and pigments. However, it can be controlled via appropriate glass selection, which filters out the harmful wavelengths. Direct sunlight has an IR component as well, which is harmful to artwork and fabrics in addition to HVAC implications. The use of shades, curtains, blinds and other diffusing media is recommended to control direct sunlight.

Energy Efficiency. Since most spaces in the home are not typically used in a lighted mode for extended periods of time, the long-term payback from relatively higher initial cost sources isn't applicable. There are those spaces, however, where the lighting is operating during the day and/or well into the evening such as kitchens, home offices, exterior landscape and/or security lighting, etc. For these areas, the use of premium fluorescent, standard or IR halogen incandescent and (in the case of exterior lighting) HID sources is recommended. The higher cost for these lamps can usually be recouped with long-term energy savings.

Controls. In most living spaces, there is usually a need to adjust the light levels for varying tasks to provide different moods, to lower the color temperature (incandescent), to increase or reduce contrast on objects, or simply to provide a reduced level of illumination. For these and other reasons, some type of dimming control is recommended. This is true not only for incandescent sources but fluorescent lamps as well. High-quality electronic dimming ballasts are available for T8, T5 and compact fluorescent lamps for areas where dimming these lamps is appropriate. For dimming low-voltage incandescent sources, make sure that the dimming controls are appropriate for the type of transformer used—magnetic or electronic—since premature lamp failure can happen if the incorrect dimmer type is used.

Lighting controls can vary from relatively low-cost simple wallbox dimmers to remote panel dimming systems that use one-touch preset buttons and interface with other home automation systems. The type of control to use will depend on budget and the client's level of technological sophistication. Clients may be willing to accept a combination of wallbox controls for the majority of spaces with certain key areas, such as dining rooms, great rooms and master suites, using preset wallbox control systems. In any event, a well thought-out control system must be an integral part of the overall lighting design scheme in any residence.

Layering the Light. Through a multi-layered design approach involving task, ambient and accent lighting, a balanced, three-dimensional lighted environment is created that allows for a variety of settings/moods. Even in a residential environment, there is always some type of task involved in each type of space. Therefore, the lighting needs to be geared towards that end. In some cases, the task lighting illumination requirements can be satisfied by either the ambient or accent lighting layer. The best methodology is to begin by providing for the task lighting requirements, then determine what ambient lighting, if any, is required to supplement this layer. Finally, provide appropriate accenting and highlighting to enhance artwork, architectural elements and the like.

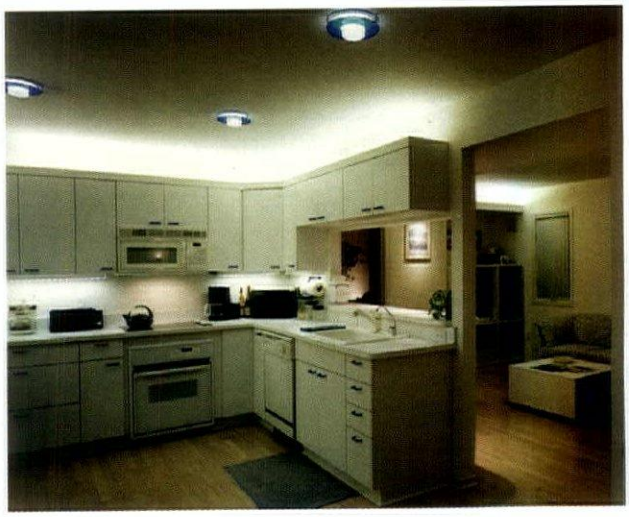

FIGURE 1—THIS KITCHEN USES A PREDOMINANTLY FLUORESCENT LIGHTING SYSTEM. UNDERCABINET T8 TASK LIGHTING IS COMBINED WITH SIDE-MOUNTED T8 STRIP FIXTURES FOR OVERCABINET INDIRECT LIGHTING ALONG WITH RECESSED BLUE GLASS LENS 13W COMPACT FLUORESCENT DOWNLIGHTS TO COMPRISE THE AMBIENT LAYER. PHOTO ©ROBERT J. EOVALDI

Kitchens. Due to their relatively high energy efficiency and general lighting capabilities, fluorescent light sources are ideally suited for use in the kitchen (see Figure 1, opposite), however, certain guidelines must be followed. For example, use 2700K-3000K color temperature fluorescent lamps to maintain a match with incandescent sources and specify fixtures that are fitted with electronic ballasts to maximize energy efficiency and eliminate noise and flicker. Some kitchen spaces, however, are not conducive to a fluorescent "look," having an abundance of wood and natural finishes that look much better under incandescent light (see Figure 2). Where incandescent sources are used, these should be either line- or low-voltage halogen for energy efficiency and longer life. Additionally, incandescent sources should operate on dimming controls to further increase life and allow for a variety of settings.

FIGURE 2—AN ABUNDANCE OF WOOD FINISHES IS BEST SUITED TO AN INCANDESCENT-SOURCED LIGHTING SCHEME. PHOTO ©ROBERT J. EOVALDI

When designing a lighting concept for the kitchen, use two basic lighting layers—task and ambient (general)—and begin with the task layer first. Provide an evenly distributed, shadow-free illuminance of 500-750 lux on the task surface. This can be accomplished with several types of fixtures, including low-glare undercabinet linear and non-linear task fixtures mounted under wall cabinets at perimeter countertops; pendants, downlights or track over islands, peninsulas and sinks; and integrated lighting in ventilation hoods over cooktops. After the task illuminance has been adequately provided for, add an ambient layer (in addition to any available daylight), providing a range of 300-500 lux average illuminance at counter height. The ambient layer should fill in shadows, reduce contrast and light vertical surfaces.

Some examples of ambient fixture types are indirect lighting mounted on top of wall-mounted cabinets, suspended indirect or direct/indirect linear fluorescent fixtures, low-glare overhead surface-mounted fixtures for smaller spaces, architectural elements such as coves and ceiling drops with integrated lighting and finally, *carefully* placed downlights. "Carefully placed" means laid out at a distance and configuration so as not to produce severe and off-center scallops on wall cabinets and appliances. Remember to think in 3D rather than to look at a 2D plan.

If possible, add a third layer for accenting any artwork and/or highlighting any architectural elements such as columns, millwork details and coves. Although this layer is often considered a "luxury" and cut from the budget, it actually can be sold as a necessary functional element for events like nightlighting or a low-level mood setting for entertaining purposes.

Bathrooms. Residential bathroom/powder room spaces should use dimmed halogen incandescent as a primary source. However, with a professional female interacting in a commercial environment, the designer should consider adding an electronically ballasted fluorescent source and switching it separately. This allows facial makeup to be applied properly for viewing in a fluorescent lamped commercial environment.

Primary tasks in a bathroom are those involving grooming such as shaving, applying makeup, arranging/setting hair, etc. Secondary tasks include clothing arrangement, inspection and clean-up. An evenly distributed, shadow-free vertical illuminance of 300-500 lux should be provided on the face or other vertically oriented task.

The type of fixtures best suited for grooming tasks is vertically oriented linear fixtures either flanking the mirror or integrated with the mirror. Other types include wall sconces or luminous pendants flanking the grooming position at face height, horizontally oriented linear wall mounted (over-mirror) fixtures with a lensed front and sufficient width to illuminate face or architectural soffits/valances with a direct/indirect distribution (see Figure 5). As a general rule, do *not* use downlights for grooming tasks as they tend to cast unfavorable shadows on facial features. If there is no other alternative or the client is partial to downlights, place them as close as possible to the mirror, spaced on either side of the grooming position and used in conjunction with a matte white countertop for upward reflectance.

Showers and tubs should always be illuminated for grooming tasks. The most common fixture is a lensed downlight with a gasketed trim ring. Usually, these are limited to 40W max. incandescent lamps due to heat restrictions. With the advent of smaller compact fluorescent lamps, the lumen output can be significantly increased with the same or less wattage per lamp, although the initial cost will be higher. Another alternative is the use of plastic fiber-optic endpoint downlights, which are quite small and can be directly exposed to water. The system, however, does require an accessible, ventilated remote space for placement of the illuminator.

In most cases, the task lighting system will also provide adequate ambient illumination in the space. This is particularly true of smaller bathrooms and powder rooms. If a separate ambient layer is needed, provide an illuminance range of 50-300 lux average. The ambient layer can be provided using lighting elements such as downlighting, indirect coves, adjustable accents, fan/light combination fixtures and wall sconces. Where possible, use a third layer for accenting/architectural highlighting purposes.

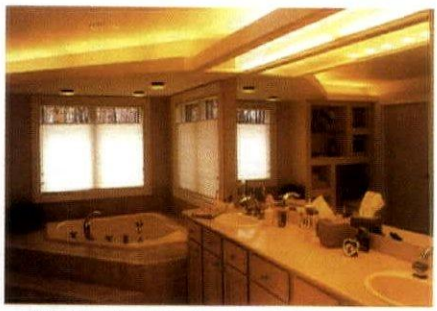

FIGURE 5—A DROPPED SOFFIT OVER THE LAVATORY/VANITY AREAS IN THIS MASTER BATH USES BOTH INCANDESCENT AND T8 FLUORESCENT STRIPS TO PROVIDE A DIRECT/INDIRECT DISTRIBUTION. THIS CUSTOM FIXTURE PROVIDES BOTH TASK AND AMBIENT LIGHTING. PHOTO ©ROBERT J. EOVALDI

Dining Rooms. This type of space is where preset multi-scene controls can be used to their full potential, allowing for a variety of lighted settings from pre-dining events to clean-up tasks. Fixture types such as suspended pendants, which fit the decorative theme over tables, low-voltage MR11, MR16 or PAR36 adjustable accents for table accenting, architectural lighting elements such as indirect coves, adjustable art accents for perimeter walls, wall sconces, sculpture niche lighting, buffet downlighting all can be used in the same space, each controlled by its own zone on a preset scene control system (see Figure 6, page 64).

Family/Living/Great Rooms. Being the true "living" area of a

FIGURE 6—SIX DIFFERENT LAYERS COMBINE TO FORM A MULTI-USE LIGHTING SYSTEM IN THIS DINING AREA. CONTROLLED BY A PRESET SCENE CONTROLLER, THESE LAYERS CAN BE INDIVIDUALLY PROGRAMMED INTO MEMORY TO PROVIDE VARIOUS FUNCTIONS. PHOTO ©ROBERT J. EOVALDI

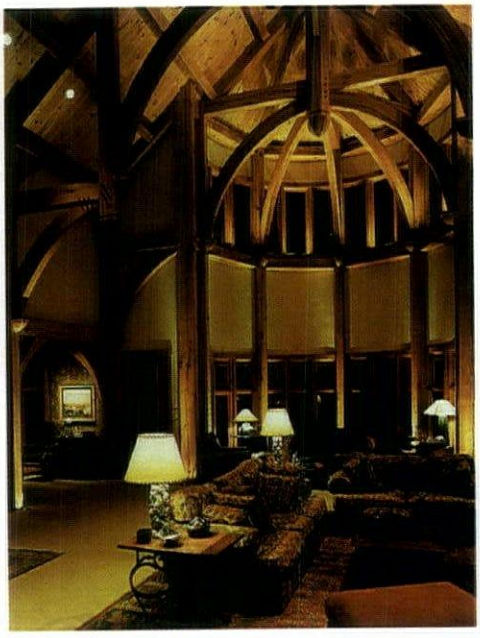

FIGURE 7—A COMBINATION OF TWO-TIERED UPLIGHTING FROM RECESSED FLOOR FIXTURES AT THE COLUMNS AND INDIRECT SCONCES AT THE UPPER WINDOW LEDGE COMBINES WITH DIRECT DOWNLIGHTING AND ART ACCENTING TO GIVE THE ARCHITECTURE THE EMPHASIS IT DESERVES. PHOTO ©ROBERT J. EOVALDI

home, a great room space should achieve a relaxing, casual atmosphere as its primary impression. This can be emphasized through the use of a non-uniform, mostly perimeter lighting system. There are occasions, however, where some tasks (e.g., puzzles, model making, crafts, etc.) might require increased levels of illumination. As was recommended for dining spaces, layering the light and using several different types of lighting effects, controlled by multiple switches/dimmers or a preset scene controller, provide a comfortable, multi-user and multi-purpose lighted space (see Figure 7). Ambient illumination is best provided by soft indirect lighting, whether from built-in cove lighting, wall-mounted uplight sconces, above wall cabinets, reflected from wall art accenting, etc. A higher level of illumination for those more involved tasks as mentioned above can be provided by adding additional layers such as downlights, wall sconces, table lamps or other accents. For maximum flexibility in aiming and adjustment, artwork, sculpture and other architectural features should be highlighted with recessed adjustable accents, surface monopoints, a track system or a wire/rail system using either standard or low-voltage incandescent, depending on the desired beam spread and light quality.

Bedrooms. Besides sleeping, which obviously requires an absence of light, other tasks in a bedroom space include dressing, superficial grooming, light reading and in the case of school-age children, homework, which can involve fairly intensive reading and writing tasks. The typical switched junction box in the center of the room will only work if a proper combination of room size and fixture type is implemented. Small rooms, in the 125 sq. ft. or less range, can usually be

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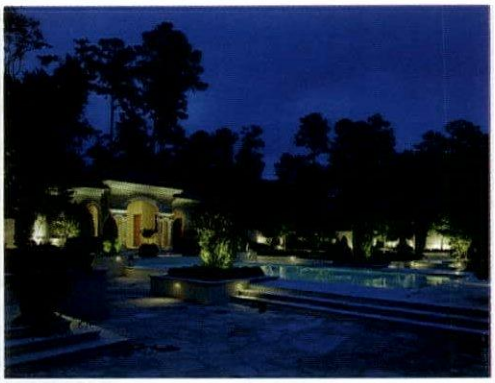
adequately illuminated with a multi-lamped ceiling fixture that provides a uniform lighting pattern throughout the space. Larger rooms will require an additional lighting layer in the form of adjustable accents, either recessed or surface (track) on one or more walls to illuminate artwork, bulletin boards, etc. Built-in architectural lighting elements such as indirect coves and wall-wash slots/soffits work well to provide functional illumination as well as visual interest. Task lighting adjacent to the bed for reading is usually best provided with table fixtures selected to match individual tastes. However, in situations where the bed is permanently placed, the use of more permanent fixtures such as wall-mounted, articulated task fixtures or suspended pendants work extremely well in providing proper illumination as well as in architecturally anchoring the bed in its location.

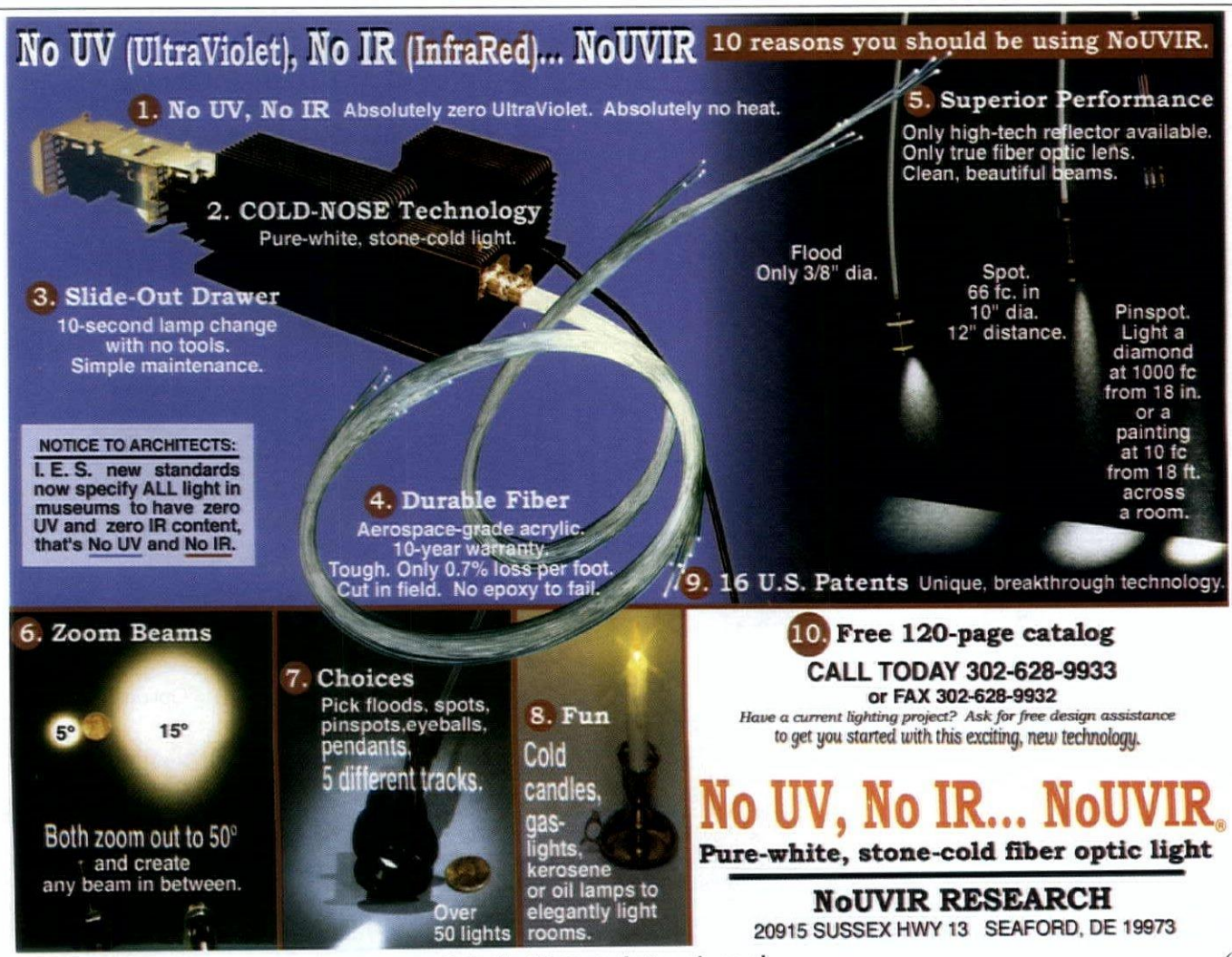


SUBTLE INCANDESCENT UPLIGHTING ON ORNAMENTAL TREES COMBINED WITH LOW-LEVEL STEPLIGHTING CREATE A UNIQUE BACKDROP TO THE FIBER-OPTICALLY LIGHTED POOL. PHOTO ©BOB DONNAN

Home Offices/Dens. Treating this space type like a true "office" instead of a relaxing home environment will have a positive impact on the user's productivity, if office work is the primary use of the space. With this in mind, a fluorescent-sourced overhead fixture (or fixtures) with a generally uniform distribution providing a relatively high task illuminance level of between 50-100 lux is recommended. These can be in the form of downlights, surface-mounted direct fixtures, suspended indirect fixtures or built-in indirect coves. Track lighting or other adjustable direct fixtures do not work well due to their inherent shadow-casting qualities. Articulated task fixtures on the desk can help to provide required task illuminance, and adding an accenting layer by highlighting artwork will help to balance the space.

Home Theaters. By using attic and basement spaces as well as "bonus" rooms over garages, the home theater is a space type that is becoming more commonplace, not just in the high-end residence, but in the average home as well. And it should be lighted like a theater, using a multi-layer lighting system with general space illumination, low-level "stumble" lighting and, just for fun, "effects" lighting. The ambient lighting need only to provide a modest illumination level of 5-30 lux, which can be achieved from a minimal use of dimmable downlights, accents or lighted architectural elements, such as indirect ceiling coves. For darkened room conditions, in-wall recessed steplights or sconces are useful in providing very low-level lighting for moving about. The media room or home theatre is also the space to have some fun with decorative elements like color-changing fiber-optic lighting, gelled fluorescent coves, theatrically themed incandescent fixtures, floor pockets and anything else that one might find in a theatrical or themed environment.

Exteriors. What lies outside the home can, at night, become a distinctive focal element both outside as well as inside. Trees, both small and large, hedges, planters, architectural elements, fences, etc. can come alive at night through the use of properly designed lighting. Large trees are best highlighted with fairly punchy line-voltage incandescent or 3K metal halide in-ground or above-ground uplighting and/or "moonlighting," which are adjustable fixtures mounted up in the



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tree itself and aimed down through the branches. Smaller, more ornamental trees, like Japanese maples, show best with low-voltage MR16 or PAR36 in-ground uplighting. Steplights mounted in stair treads, planters, retaining walls, etc. provide small pools of light at key locations, defining a path or significant area. Swimming pools, spas, fountains and other water features can become dynamic visual elements at night with color-changing fiber-optic lighting. All exterior lighting should be carefully thought out with regard to control and the interior area where it is to be viewed. Grouping or "zoning" separate exterior areas so that they can be adjusted from the adjacent interior space's control scheme allows for real-time balancing of the interior and exterior.

SOME FURTHER READING:

- *The Art of Illumination, Residential Lighting Design*, by Glenn M. Johnson, LC, IALD. McGraw-Hill Publishing.
- *Residential Lighting – Creating Dynamic Living Spaces*, by Randall Whitehead, IALD. Rockport Publishing.
- *The Art of Outdoor Lighting*, by Randall Whitehead, IALD. Rockport Publishing.
- Additional articles on this topic can be found at www.lightforum.com/design/index.html.

Jeff Brown, IALD is principal of Colorlume Inc. in Carrboro, NC.

NCQLP QUIZ

1. HID is a potential light source for which area of the home:
A. Great Room
B. Home Theater/Media Room
C. Exterior
D. Dining Room

2. Downlights should only be used at a bathroom mirror if:
A. They use specular Alzak reflectors
B. They are close to the mirror and either side of the user
C. They use high color rendering compact fluorescent sources
D. The room surfaces are matte white

3. Multi-scene preset lighting controls:
A. Are best suited for spaces with many functions
B. Are too complex for the average homeowner
C. Should only be used in dining areas
D. Cannot handle more than four zones of lighting

4. Built-in architectural indirect coves
A. Are primarily for commercial, not residential, spaces
B. Can only use fluorescent or neon sources
C. Provide a soft, low-glare uniform lighting effect
D. Should not be used in conjunction with other fixtures

5. For "stumble" lighting in the home theater, which fixture type works best:
A. Steplight
B. Downlight
C. Torchiere Uplight
D. Track Lighting

Responses should be addressed to Christina Trauthwein, Architectural Lighting Magazine, One Penn Plaza, New York, NY 10119; faxed to 212-279-3955 or emailed to ctrauthwein@mfi.com All questions must receive correct responses to obtain 0.5 LEU credit.

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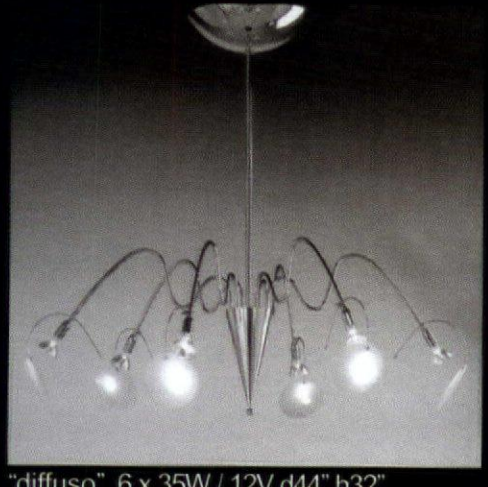

"diffuso" 6 x 35W / 12V d44" h32"

"arte" 601/605 L34" w28" h7"

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MAGNETIC & ELECTRONIC BALLASTS—WHICH & WHEN TO SPECIFY

BY STEPHEN BLACKMAN, IES

First, you select the type of fluorescent fixture that is just right for your project. Then, you make your way through the piles of telephone book-sized lighting fixture catalogs to determine which particular fixture family has all of the specific bells and whistles that your particular application calls for. Next, you check size, lamping, finishes and over a dozen available options. And then you get to the one option that seems to be a simple decision. Should you specify an electronic ballast or a magnetic one?

The decision seems easy enough. If the budget has enough money in it to have an electronic ballast in all of the fixtures needed for the job, then go electronic, since we all know electronic is better then fluorescent. Or is it? While in many cases, the obvious solution would indicate selecting electronic ballasts, it is important to remember that magnetic ballasts, while seemingly "outdated," have significant benefits in certain applications. While this article in no way endorses one over the other, its intent is to discuss magnetic ballasts as still remaining a viable—and not-to-be-dismissed—option in ballast selection.

Magnetic ballasts have been around for more than 70 years. At this point in time, they are just not that exciting any more and just can't match all of the glossy ad copy and marketing efforts that are lavished on the far more technologically advanced electronic ballasts.

Magnetic ballasts (or electromagnetic ballasts) have a core of laminated steel plates surrounded by one, two or more copper or aluminum wire coils, which is then connected to a power capacitor and is finally placed in potting compound in a metal case. These components provide the proper conditions for starting and controlling the current flow to the fluorescent lamps. The grade of the component materials can affect the energy efficiency of the ballast. Magnetic ballasts generally operate the lamp at the line frequency of approximately 60 Hz.

Electronic ballasts are usually of a solid-state construction and use semi-conductor components to change the electrical frequency along with small inductive and/or capacitive components to provide the starting and regulating functions. These ballasts raise the line frequency to generally operate lamps at a very high frequency of 20,000 to 60,000 Hz. A higher frequency is a more efficient way to excite the gas mixture in a typical fluorescent lamp. For many popular lamps, this can lead to an increased efficacy of about 10 percent.

The electronic ballasts now are becoming very popular and are generally considered a more efficient ballast. So why should we still care about the magnetic ballast? And also why are these dinosaurs still around cluttering up the specification pages of these sleek, new cutting-edge lighting fixtures?

The answer is that magnetic ballasts have a certain set of characteristics that is preferable to electronic ballasts. This is seen in a comparison of various features and by an examination of several specific applications of which many people may not be aware.

FIGURING COST

The first and most obvious feature is that magnetic ballasts have a basic cost advantage. Higher-end electronic ballasts with all of their intricate sophisticated circuitry can be as much as two or more times the cost of comparable magnetic ballasts for the same lamp type. While saving energy is always a prime concern in fixture selection, the payback point, where the energy savings would equal the extra cost spent for the electronic ballasts, can fluctuate between two years to up to 15 years in certain situations. Other variables are factored into these equations such as replacement costs of premature lamp and ballast burnouts (and their associated maintenance costs) and lamp output degradation due to normal dirt accumulation and premature blackening of lamp ends. It can be argued that in some commercial applications, payback for the investment in electronic ballasts may not occur during the lifetime of even some 10-year leases. Each case needs to be evaluated separately.

A CASE OF OVERHEATING

One of the first issues to consider when specifying a ballast is heat. Even before energy efficiency issues are considered, a key concern is if a ballast will remain usable and not self-destruct in a burnt-out glob of circuit board soup. Magnetic ballasts are renowned for their simplicity and reliability. This translates to long life even in rugged environments. Heat is the great equalizer when comparing electronic to magnetic ballasts. According to The Robertson Transformer Company, magnetic ballasts have the capacity to operate with a case temperature generally up to 90 degrees Centigrade (194 degrees Fahrenheit) while most electronic ballasts are warranted to safely operate with a case temperature of only up to 75 degrees Centigrade (167 degrees Fahrenheit) maximum.

According to the Certified Ballast Manufacturers organization, magnetic ballasts generally are designed to have a median life span of 12 to 15 years. When the ballast has operated in an overheated situation for long periods of time, a breakdown of the internal magnet wires may occur, which will gradually show up as difficult starting or as cycling on and off during operation. An overheated case temperature occurs generally over 90 degrees Centigrade. Even when the temperature climbs 10 degrees over the allowable UL limit of 90 degrees

Magnetic vs. Electronic Ballast

(for Linear and Compact Fluorescent)

Magnetic Ballast	Electronic Ballast
Advantages: • Lower cost • Availability for a wide variety of lamp wattages, larger selection • Low levels of electrical noise (transmitted through the electrical wiring) • Does not promote IR frequency interference • Proven durability, ruggedness • Withstand higher ambient temperatures • Low levels of current distortion	**Advantages:** • Flicker-free lamp operation • Low or no audible noise • Smaller size and weight for a given power level vs. magnetic • Possible to extend lamp life with programmed start ballasts • Lower temperature rise vs. comparable magnetic at given power level • Premium designs now being offered for multiple input voltages, 120 to 277V • More suitable for dimming, especially continuous dimming • High power factor • Low total harmonic distortion • Energy efficient, helps provide higher light level with low energy usage
Disadvantages: • Audible noise, (certain designs and less expensive manufacturing processes can allow vibration and hum to occur) • Longer lamp starting time of two-pin compact fluorescent (preheat) lamps or linear 4-pin preheat types (with starters) • Potential lamp flicker, (even more prominent at 50 Hz input) • Less efficient compared to electronic (premium magnetic vs. premium electronic) • Larger size and weight	**Disadvantages:** • Line conducted and/or radiated electrical noise, higher than magnetic • Problem at end-of-life for compact fluorescent lamps (if ballast doesn't incorporate end-of-life detection and shutdown, the ballast will continue to try and start burnt-out lamps) • Higher cost of a soundly designed electronic ballast with high efficiency features • Potential for large inrush currents (if not designed to limit, this inrush can lead to damage of connected electronic control devices)

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Centigrade, the ballast life may possibly be measurably cut, but it will continue to operate lamps with no short-term problems.

Electronic ballasts are purported to last up to and possibly over 15 years. Since electronic ballasts manufactured today are more reliable than those of just 10 years ago, it is hard to collect enough long-term information on life to draw a firm conclusion. However, when a long-term overheating situation occurs, a more dramatic failure occurs. This failure involves shorted transistors, blown fusing and other destroyed electronic circuitry components. Without warning, when these situations happen, fixtures will fail to light or will extinguish suddenly. Long-term overheating (generally over 75 degrees Centigrade) can kill an electronic ballast in three years or even in three months.

Why should the fixture specifier worry about heat? Surely the fixture manufacturer has taken this into consideration before offering each option. Well, fixture manufacturing is not an exact science and neither is anticipating where each fixture might be installed. Obviously, the heat at the ceiling level is greater than at the floor level. Surface-mounted on a tall ceiling with no air circulation, a multi-lamp, high-wattage fixture with an enclosed lens and moderately vented ballast compartment can become an oven. A pendant fixture with four to six compact fluorescent lamps arranged in a pinwheel from the center can concentrate a large amount of heat in a very small area. The enclosed ballasts above the pinwheel can eventually heat up, wither and cause an early breakdown unless the heat is properly vented or dissipated.

Heat degradation of ballasts unfortunately is a common problem known to many manufacturers. So why do they offer the delicate electronic ballast as an option? Electronic ballasts are offered because they are what many specifiers ask for. In this day and age, it is very difficult to offer a commercial-grade fixture without an electronic ballast option. Most all fixtures sold today pass all of the UL requirements, fire safety and national electrical codes. But specification-grade fixtures today have so many variations and options that most test procedures can't effectively guarantee the long-term ruggedness of every one of the multitude of options available. So just because the fixture might work in theory or work well for the first year, it doesn't mean that the fixture will always have a long or reliable life.

WIRELESS INTERFERENCE

Electronic ballasts operate on a very high frequency (between 18,000 to 100,000 Hz) as compared with magnetic ballasts (60 Hz). This allows a better and more efficient excitation of the gas inside of the fluorescent lamp, thereby providing a light source of greater efficacy. However, driving lamps at this high frequency has its side effects. Among them is a disruption of transmitted IR control signals. These signals are commonly used in TV, VCR and cable remote controls, LAN networks, video conferencing, computer peripherals and even medical equipment.

A NEMA (National Electrical Manufacturers Association) white paper from 1999 reports that indeed, in addition to visible light, fluorescent lamps also emit a small amount of IR radiation when driven at high frequencies by electronic transformers. It has been determined that certain lamp/ballast combinations do emit IR within the frequency range of many remote control devices. Although many variables will affect the likelihood of this interference occurring in all situations, there are numerous cases of TV sets changing the channels on their own and VCRs turning themselves on and off. The location of the fluorescent lamp and ballast and/or changing the line of sight to the IR receiver is critical in solving this problem. It has been also noted that compact fluorescent lamps that are self-ballasted with low cost, miniaturized electronic ballasts (i.e. screw-in retrofits) have been shown to have a higher likelihood to make this strange disturbance occur.

THEORY OF COMPATIBILITY

As hard as it is to believe, information is just now being revealed that some high-frequency electronic ballasts have the tendency to lower life expectancies for the common "energy-saving" (ES) fluorescent lamps. As reported in the NEMA report, *34W Fluorescent Lamps and High Frequency Electronic Ballasts*:

"Conclusive tests show that (ES) lamps that start reliably on a given electronic ballast on initial start up can become non-starting lamps later in life....Unfortunately, it is not possible to predict at what point this condition can occur. In some cases, it has been observed as early as approximately 3,000 hours into the life of the lamp. In one instance, approximately 20 to 30 percent of the (ES) lamps were found to exhibit starting problems when aged to approximately 10,000 hours in the field."

At this point, this finding has not been officially corroborated by other agencies. The theory that is currently emerging as to why the electronic ballasts are causing premature lamp failure addresses the coatings on the inside of the ES lamps. The ES lamps (F34T-12) developed in the '70s in response to the need to save energy in light of the oil embargo were originally designed to be run by magnetic ballasts. This efficiency was gained by the new krypton gas mixture inside the lamp. The standard magnetic ballast was not capable of reliably starting this lamp, so a conductive coating was applied inside the tube to assist the start and operation of this lamp. The composition, thickness and placement of this coating in relation to the filaments are what have been causing a variety of starting and lamp life problems for electronic ballasts operating these lamp types.

These problems range from the inability to start the lamps to premature end blackening and ultimately early lamp failure. The NEMA reports also states that for lamps that are exhibiting these types of problems, "If such lamps are removed and installed in fixtures operating with 60-Hz ballasts (magnetic ballasts), the lamps will start and operate normally." Unfortunately, there are many variables that affect lamp life and this problem can not be reliably replicated with all the different lamp/electronic ballasts combinations currently available. Testing into this issue is still ongoing.

What is known at this point is that the seemingly easy question of choosing an electronic ballast over a magnetic ballast is not that easy. Electronic ballasts deliver energy efficiency, quick illumination and luxurious dimming possibilities. However, depending on the application, the old reliable magnetic ballast should be given some serious consideration. For now, rest assured that magnetic ballasts will continue to be around for a while to come. Just in case. ■

Stephen Blackman is principal of Blackman Design Associates, an industrial design and engineering firm. The author can be contacted at: sblackman@blackmandesign.com.

For additional information on this topic and other technology articles, visit www.lightforum.com/technology/index.html.

DOE'S NEW FLUORESCENT BALLAST REGULATIONS

Due to incorrect and incomplete information that appeared regarding this issue in the June/July edition of* Architectural Lighting *(News Updates, page 12), we are reprinting the information in its correct and complete format.

The Department of Energy (DOE) will be implementing new regulations regarding the manufacture and sale of fluorescent lamp ballasts. Hammered out in two days of negotiations between energy advocacy groups and lighting component manufacturers, the new ballast efficiency standards, when adopted, are expected to save enough energy by 2030 to power between 12-26 million homes in the U.S. Other benefits include a reduction of greenhouse gases equivalent to removing 58 million cars from the roads.

Negotiations resulted in the creation of a reasonable timetable, which would allow manufacturers to make the transition without closing factories or writing off millions of dollars of investment. Highlights of the timetable include:

• Effective **April 1, 2005**, ballast manufacturers can no longer produce ballasts for installation into new lighting fixtures unless they meet the new minimum ballast efficacy requirements (BEF) set forth in the proposed rule. With existing technology, only electronic ballasts comply with these guidelines for the F40T12 and F96T12 lamps. Energy-efficient magnetic ballasts for F96T12HO lamps now rated for -20 degrees Fahrenheit will be required for all applications except outdoor signs. Exceptions will be ballasts with power factors less than 0.90 that are designed and labeled for use in residential buildings applications and ballasts that dim 50 percent or less of their maximum output. The exemption for 0 degrees Fahrenheit starting is removed.

• The law does not set minimum requirements for T8 lamps, since there are a few applications where electronic ballasts would not be used and the low-frequency magnetic ballasts would be necessary—such as electronic-sensitive installations.

• The manufacture of ballasts not compliant with the new BEF values, but still meeting the old BEF values, is allowed for replacement use only until **June 30, 2010**. These products must be manufactured with short leads, packaged in quantities of ten or less and marked "FOR REPLACEMENT USE ONLY."

• Effective **July 1, 2005**: Ballast manufacturers can no longer sell ballasts that do not meet the new BEF requirements.

• Effective **April 1, 2006**: Lighting fixture manufacturers can no longer incorporate ballasts that do not meet the new BEF requirements in new fixtures.

• Effective **July 1, 2010**: Ballasts, including replacements, can no longer be manufactured unless they meet the new BEF guidelines.

For more information, visit the DOE's dedicated website at *www.eren.doe.gov/buildings/codes_standards/applbrf/ballast.html.*

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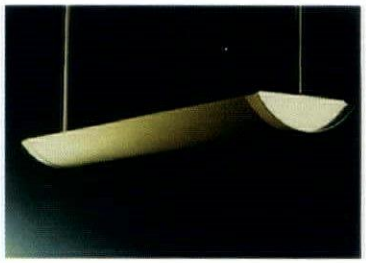
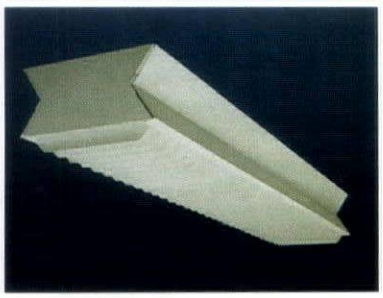
Always free for those looking for a career in lighting.

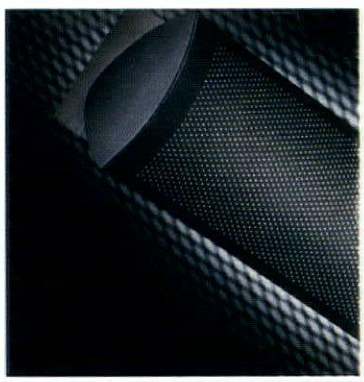
Lamar Lighting's QR Series features an indirect center light source and can be mounted individually or in continuous rows. Constructed of 20-gauge cold rolled steel and powder-coated white, the fixture is offered with a one-piece solid or perforated shield and smooth-rolled bottom for uniform, indirect illumination. Corners are internally overlapped and welded to prevent light leakage and ensure continuity in runs. Various sizes and lamp and ballast combinations are available. **Circle No. 40**

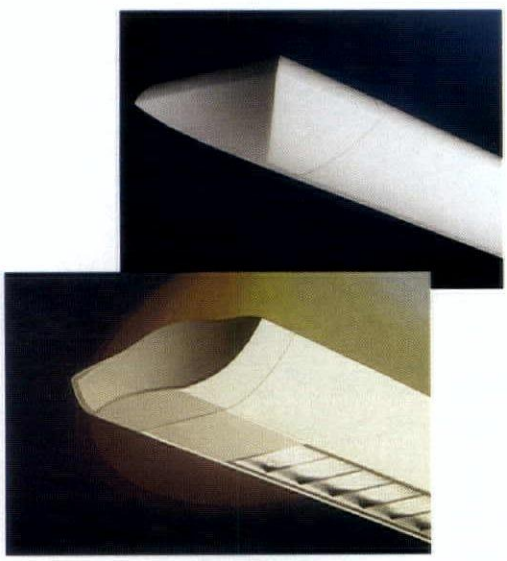




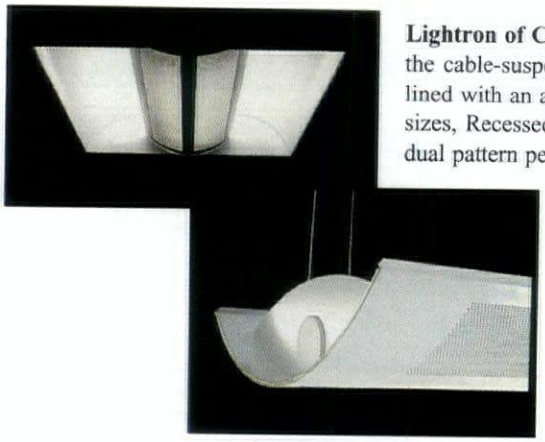
From **Day-Brite|Capri|Omega Lighting**, eQ Series fixtures provide 15-percent uplight for indirect illumination and 85-percent direct illumination. The classroom fixtures' optical perforated side panels provide more illumination above 90 degrees for increased spacing between rows. Standard features include sliding mounting brackets that can be adjusted to match installed pendants or cables and electronic ballasts. Electromagnetic ballasts are also available. **Circle No. 41**

The new V3 adjustable distribution wall valance from **Litecontrol** offers a choice of three distribution settings for varying combinations of uplight and downlight. V3 is available in solid and perforated fascia designs with die-formed steel housing and fascia. Lamping options include T5, T5/HO and T8. The ADA-compliant V3 can be mounted individually or in rows and is offered in 3-, 4-, 6- or 8-ft. lengths. **Circle No. 42**



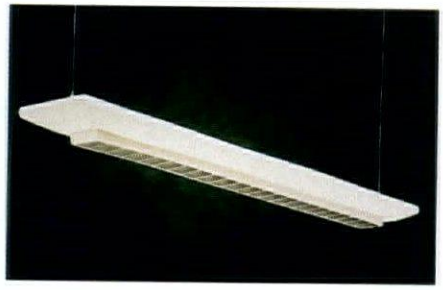


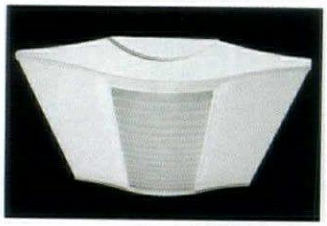
From **Ledalite Architectural Products**, both Flexxa LP (top) and Sonata (bottom) use T5/HO or T8 lamps. Measuring $2^1/_4$ in. x $6^1/_2$ in., the Flexxa LP indirect fixture features extruded aluminum construction and adjustable mounts for easier system leveling. A two T5/HO-lamp option is available as well as a wall-mounted version with an asymmetric optical system. Sonata is available in indirect, semi-indirect and direct/indirect distributions. On direct/indirect models, Ledalite's Variable Optics technology allows the amount of downlight to be adjusted in the field. The Variable Optics uplight option can be used to limit visible brightness from the T5/HO lamp. In the semi-indirect configuration, the brightness on the lower, perforated optic can be adjusted via the Variable Luminance Filter to match ceiling brightness levels. **Circle No. 43**



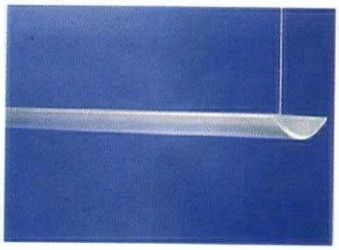
Lightron of Cornwall's Recessed Authentica (top) is designed to coordinate with the cable-suspended Authentica (bottom), which features dual perforated housing lined with an acrylic white panel for light diffusion. Offered in 2 x 2, 1 x 4, 2 x 4 sizes, Recessed Authentica is equipped with an opal acrylic diffuser with a linear dual pattern perforated basket. Authentica, available in 4- and 8-ft. lengths, can be mounted individually or in continuous rows. Housing for both is constructed of die-formed, 20-gauge cold rolled steel with white polyester powder-coated finish. Both Recessed Authentica and Authentica are designed for use with T5 or T8 lamps. **Circle No. 44**

Lytespread LSB from **Lightolier** features an extruded aluminum housing in a selection of light control media and lamping options. Distribution controls range from 100-percent indirect to 70-percent indirect/30-percent direct, depending upon lamping and light control media options. Indirect shielding, rectangular piercings, parabolic louvers and radial louvers are available. Lamping options include T5/HO, T5 and T8 sources. **Circle No. 45**





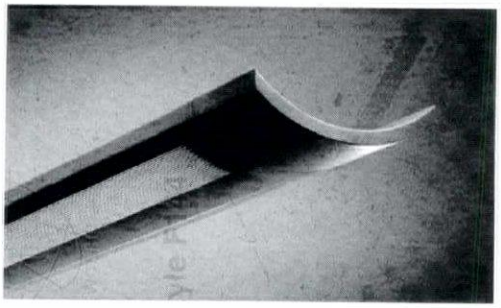
As part of its T5 product development strategy, Cooper Lighting's **Metalux Lighting** has introduced four new fixtures, including T5 additions to Horizon and Ovation and Cricket, a T5 microstriplight. Aerial (shown) is a surface-mounted general lighting fixture with interchangeable shielding media and louver options. **Circle No. 46**



From **Lam Lighting**, the Epitome indirect pendant can be suspended 12 in. from the ceiling with aircraft-grade aluminum cables and is available in 2-, 4- and 8-ft. lengths. Endplates may be omitted for continuous row configurations. Epitome uses T5 or T5/HO fluorescent lamps, which may be shielded with an clear acrylic dust cover. The 1 1/2-in.-deep housing is constructed of 18-gauge cold rolled steel with beveled endplates. Other features include a computer-enhanced rigid specular aluminum reflector and integral electronic ballast. Various colors available. **Circle No. 48**

Light in Light from **Wila Lighting** provides approximately 20-percent diffuse illumination and 80-percent directed light. Light in Light features white diffuse reflectors, glass screen and a round non-directional design. **Circle No. 47**

Focal Point's Verve II series offers both pendant and wall-mount fixtures. Verve II is designed for use with T5, T5/HO and T8 lamps. Housing options include solid for indirect illumination and perforated or slotted for indirect/direct illumination. Suspended models measure 2 in. x 9 in. and are offered with aircraft cables or rigid suspension. Wall-mount versions measure 2 in. x 6 in and feature asymmetric distribution. Length must be designated in feet. Both can be mounted in a continuous row. **Circle No. 49**



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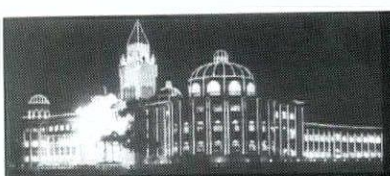

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THE GOOD, THE BAD AND THE UGLY

BY GUY ESBERG

They're used on almost every kind of project, from churches to offices to residential complexes. In fact, because of codes and safety, they're found in all settings, from the most utilitarian to the most elegant. If you haven't guessed, the fixtures to which I'm referring belong to the high-abuse or vandal-resistant category. . . a category historically neglected by many designers and clients alike.

Given the diversity of projects on which they're found, one would expect to see an appropriate selection of fixture designs and quality levels in use. Take a good look around, however, and you'll find that these fixtures are frequently beneath the design and quality levels of the architecture to which they're applied.

Some might consider that this is too much attention to pay such an "unimportant" fixture category. Yet luminaires of this genre can have a pronounced negative impact on their surroundings. Industrial in styling, with UV-yellowed lenses framing layers of dead insects, such aesthetic abominations can all but destroy certain aspects of a project's visual appeal.

Years ago, high-abuse fixtures were designed purely on the basis of function. Since resistance to vandalism was their sole reason for existence, aesthetics weren't really considered. With many people believing that fixtures had to look tough to be tough, most fixtures looked like refugees from an industrial parts swap meet. On projects where attractive fixtures were insisted upon, the answer was usually custom in nature.

In recent years, however, some manufacturers have finally developed products far more visually pleasing than their predecessors. Their attention to aesthetics, combined with advancements in both materials and light sources, has resulted in fixtures more architecturally oriented, more resistant to abuse and less susceptible to the visible accumulation of bugs and dirt than ever before (there's even a metric for resistance to such accumulation, called the "I.P. rating").

ALL THREE OF THESE FIXTURES WERE FOUND ON HIGH-END PROJECTS, THOUGH ONLY ONE IS APPROPRIATE TO ITS SURROUNDINGS (BOTTOM).

The best fixtures also produce much less glare with lenses that can last up to a decade without noticeable discoloration. By contrast, other attractive products feature shielding that looks fine at installation but begins to yellow after only a year or two of use.

Given the availability of superior fixtures, why does there remain such widespread use of unattractive, industrially "styled" fixtures on projects that deserve better? Can architects truly approve of fixtures that degrade the appearance of their designs? After all, we're not just talking about lighting utilitarian buildings, since the worst examples often appear where visual appeal is an obvious priority.

Charles Schrader, FAIA, an architect who has specialized in educational facilities for much of his career, related that although he has regularly specified the most architecturally appropriate fixtures available, ". . . we've often had to make a concerted effort to keep our vandal-resistant lighting specs intact; not many clients realize how much these fixtures can negatively impact the appearance of an area, so it's a natural place for them to try and cut costs."

Deb Witte of San Francisco-based Lighting By Design concurred: "Few owners take the time to consider all views of a building. They incorrectly assume that because fixtures aren't located at the main entrance, they won't be visible to people using that entrance." She observes that such fixtures often fall outside the contractual responsibilities of those most sensitive to their impact and are therefore selected by people charged only with meeting code requirements at the lowest possible cost. "High-abuse lighting often falls into the 'back of house' category, meaning that nobody's being paid to specifically take care of it and also that it's a logical place to minimize expenditures."

Whatever the reasons, allowing vandal-resistant fixtures to negatively impact the visual quality of a project has become unnecessary. The cost to upgrade to superior fixtures is typically quite minor, particularly since relatively small quantities of such fixtures are required on most jobs.

Perhaps we should consider the following questions:

- From the owner's standpoint, does it really make sense to have a few poorly designed light fixtures compromise a project's attractiveness, particularly when considerable money is (typically) spent on other aspects of the project's appearance?
- Do designers actually want their architectural details and carefully chosen materials to share space with light fixtures that are ugly from the start—and get progressively uglier over time?
- And finally, on behalf of the public—the people who live with these projects day after day, year after year—shouldn't we put forth our best efforts to create and maintain a visual environment that's as pleasing as reasonably possible?

Since the industry has finally created some high-abuse fixtures that are both attractive and engineered to stay that way, perhaps lighting professionals should consider educating their clients about the advantages of superior vandal-resistant luminaires. As far as I can see, there are obvious benefits for everyone concerned. ■

Guy Esberg, principal of Guy Esberg & Co., has spent 23 years in the lighting industry.

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