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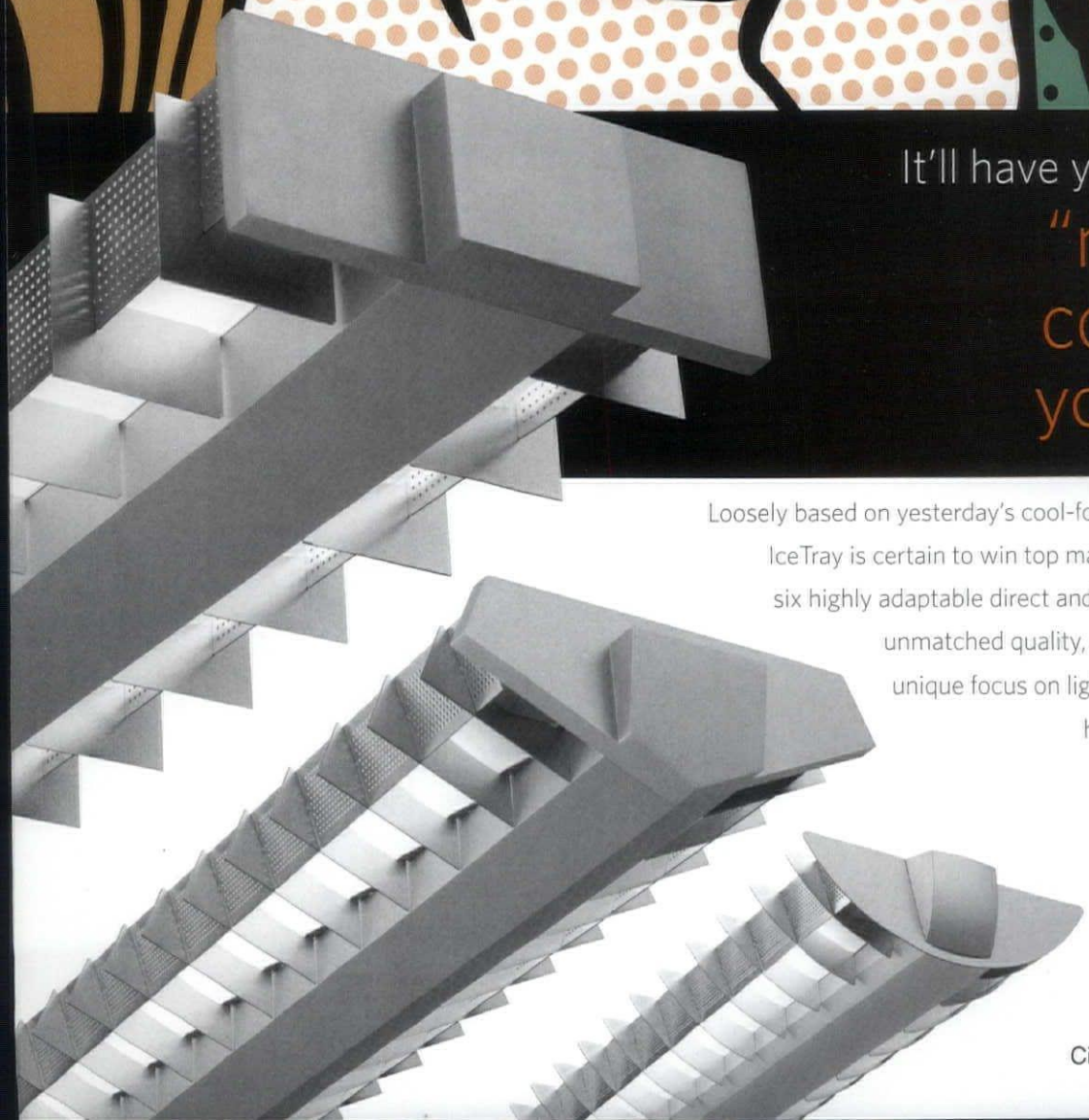

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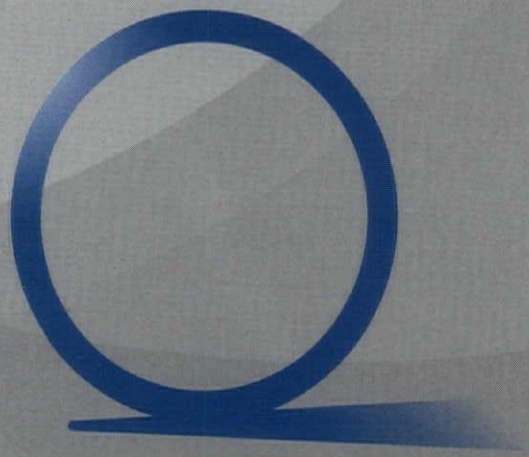

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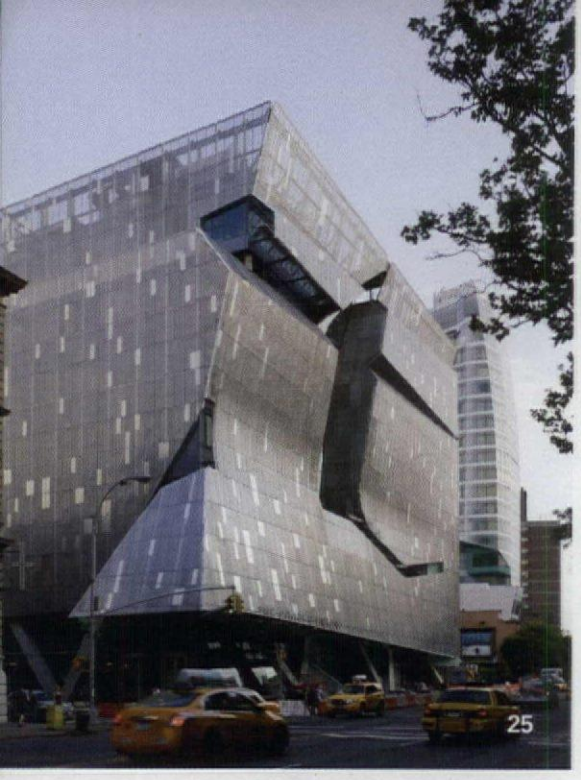

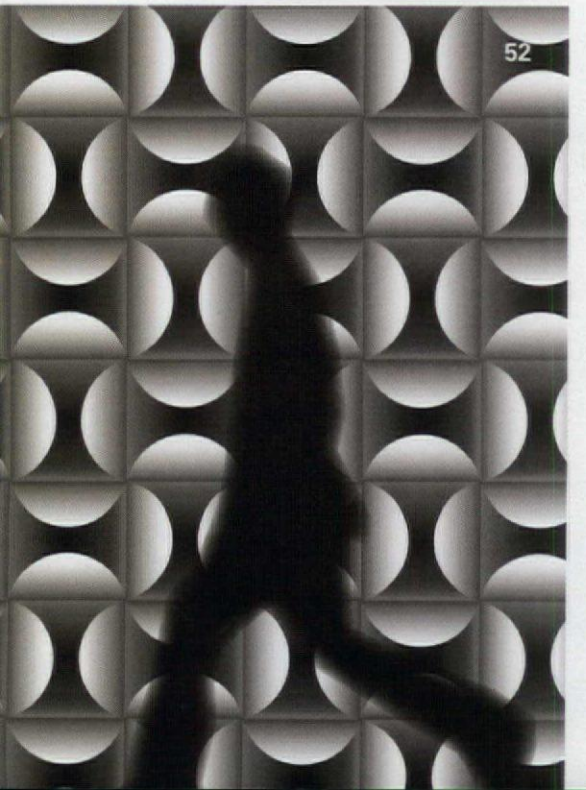

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JEAN CHOI, YU-CHENG KOH, THOMAS WONG

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Save the Educators

There isn't any sector of business or everyday life that hasn't been affected by the economic downturn, and higher education certainly is no exception. Regardless of whether it's a public or private entity, all academic institutions are feeling a similar squeeze—decimated endowments, salary freezes, smaller operating budgets, and more. For a subject like lighting, which is already a relatively small academic focus at many colleges and universities, this course of study is under even more pressure to hold its own for administrative consideration.

While many might be quick to say that current economic pressures put lighting students at greatest risk, I would argue that it is educators who are most vulnerable. There always will be individuals who are interested in studying lighting design, but that is irrelevant if there is no one to teach them. There needs to be a greater mechanism of support for lighting educators if there is to be a future for lighting education.

Around the globe, lighting education is at a critical juncture. Programs are set up in such a way that the responsibility usually has fallen on the shoulders of a single individual, sometimes two people, to lead a program. A big problem is: What happens when an individual retires, moves to another teaching position, or decides to change jobs and leave academia? What then becomes of the lighting program and the faculty who remain (if a program is fortunate enough to have more than one individual)? There has to be a way to buoy lighting programs so their fate can exist beyond its connection to a particular individual.

Two things need to happen to set lighting education on a sustainable course for the next decade and beyond: the creation of a master plan—an overall roadmap/agenda—for lighting education and the establishment of an annual conference for lighting educators.

To begin, educators should initiate a master plan effort and consult with various parties in the lighting community. This way, everyone from educators to designers and manufacturers can have a voice in setting up the program. Education needs to be viewed as a responsibility shared by the entire industry.

A master plan will help collectively set goals to reach a target number of educators, students, and lighting programs. It will help evaluate whether resources should be put toward expansion of existing programs or if new programs should be initiated. It also will help figure out if there are untapped opportunities for collaboration with existing design and engineering programs.

No matter the specifics of the institution and its local culture—whether someone is focused on a tenure track position requiring a Ph.D. or is teaching in an adjunct capacity—there are educational commonalities and concerns that cut across the specific differences. There has to be a way for everyone to be able to share their experiences. That's where an annual conference for lighting educators comes in.

The most recent major lighting educators' conference was held in the late 1990s and organized by David DiLaura at the University of Colorado. Although there have been a few smaller meetings since, as well as the occasional seminar at the various lighting conferences, there never has been a stand-alone follow-up to the Colorado conference. The idea of holding a new conference for educators was informally discussed at the IALD Enlighten Conference in early October and then again at the Professional Lighting Design Conference in Berlin at the end of the month. According to Jean Sundin, director of education for the Professional Lighting Designer's Association, one of the outcomes of the Berlin meeting was the decision to hold such a conference in June 2010. Details are still to be worked out.

Lighting education and support for educators is not an issue dependent on professional affiliation or home institution. Preserving this essential resource should be at the core of the lighting industry's priorities. With all academic design programs, as well as related scholarship and grant initiatives, facing increased pressure for survival, the creation of a lighting education master plan and educators' conference would seem to be a smart starting point. Otherwise, lighting education is not going to pass its final exam.

ELIZABETH DONOFF
EDITOR

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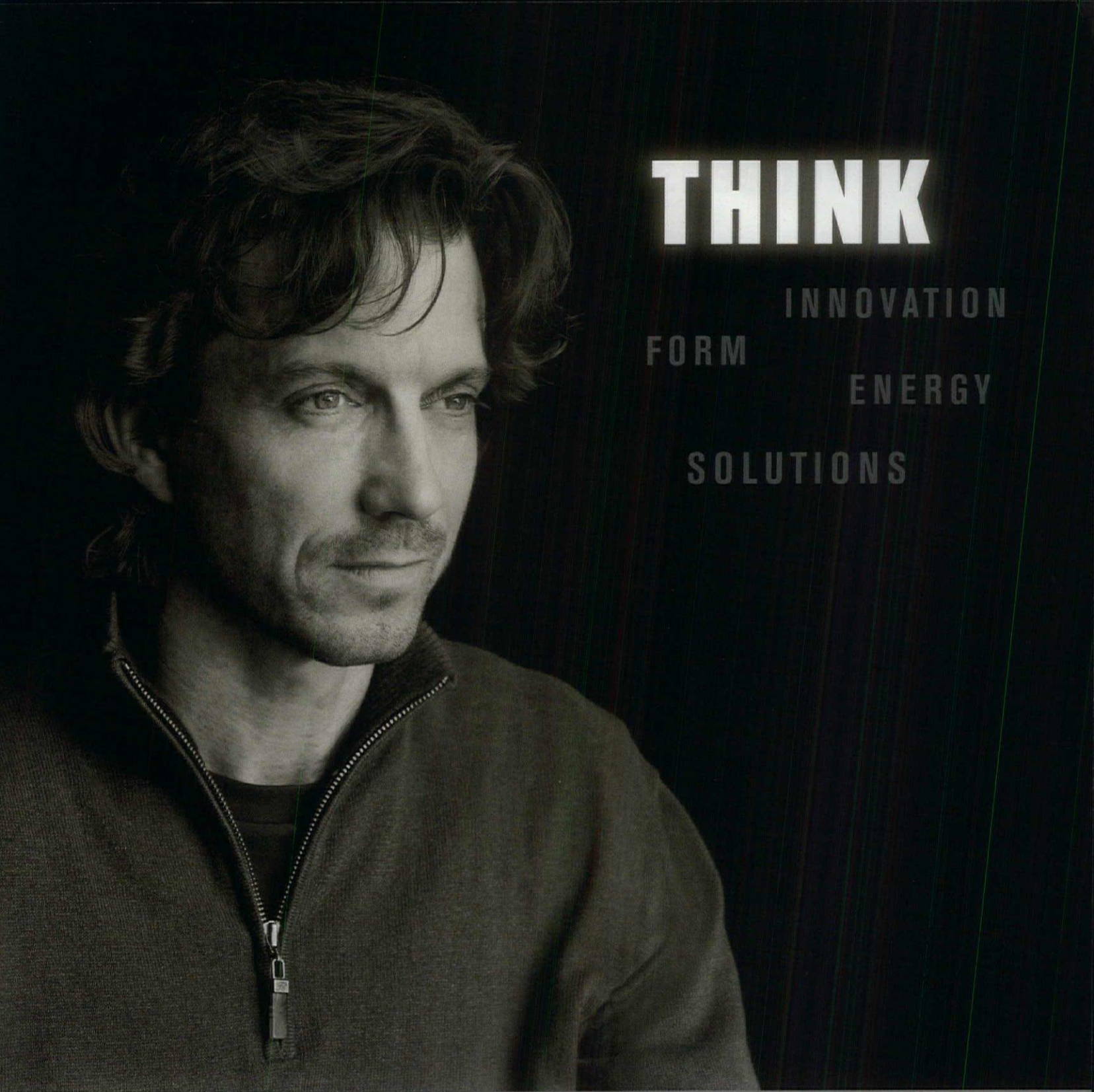

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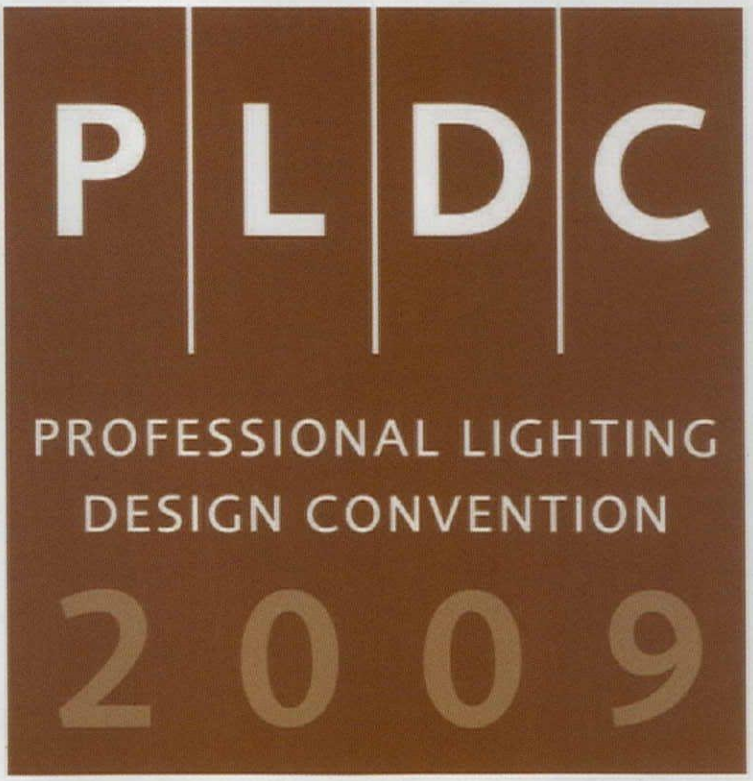
PLDC Succeeds with Sophomore Effort

Building on the success of its first global lighting design convention held in London in 2007, this year's Professional Lighting Design Convention once again proved to be a formidable event. More than 1,100 individuals involved in lighting from 43 countries around the world representing design, manufacturing, research, education, and public policy gathered in Berlin from Oct. 29 to 31 for a program devoted to all aspects of the lighting design discipline. And while there were a series of preconvention gatherings, including a City Planners' Forum and invitation-only sustainability and education meetings, the main conference treated attendees to a packed lineup that included five keynote speakers, 65 paper presentations, a special series of student presentations known as Vox Juventa, and a gala finale celebration.



THE PRESENTATIONS

Similar to the 2007 conference, the papers, which were reviewed and selected by an independent jury of lighting design professionals, were organized into four tracks: lighting design research, lighting application cases studies, daylighting and sustainability, and professional practice issues. There was a heavy bent on presentations that focused on light and health topics, daylighting techniques, and lighting case studies for museum applications and urban place making. The most thought-provoking keynote talks were delivered by Dr. George Brainard of Thomas Jefferson University, Department of Neurology in Philadelphia, who spoke on the physiological impact of light on humans, and Mark Rea from the Lighting Research Center in Troy, N.Y., who discussed sustainability as a collaborative foundation for science and design. With first-rate speakers often presenting simultaneously, it proved difficult to choose which seminar to attend.

Standout presentations included Gabriele von Kardorff's overview of the lighting design for the decade-long rebuilding of the Neues Museum in Berlin; Speirs and Major's in-depth master class review of its designs for St. Paul's Cathedral in London and the Grand Mosque in the United Arab Emirates (UAE); Ulrike Brandi's discussion of her firm's work on the lighting master plan for Rotterdam, Netherlands; Roger Narboni's presentation of his lighting design master plan for the Grand Canal in Hangzhou, China; and Paul Traynor's talk on "bokeh," the phenomenon of unfocused light first noticed in photography. A strong contingent of lighting designers from the United States presented 11 of the sessions and reinforced the fact that U.S. practitioners and institutions are conducting some of the most advanced daylighting and lighting research.

If there is one criticism to level against the event, it would be that the 12 papers on view through the electronic PowerPoint poster sessions seemed to get short changed. There could have been a clearer announcement that these presentations were going to be shown, as well as a more definitive statement of where they would be held. Additionally, there appeared to be some kind of ongoing technical difficulties that prevented the PowerPoints from being seen on a regular basis. As a result, there really was no chance to see these presentations.

That being said, the event ended on a high note, a celebration of light designed by Herbert Cybulska specifically for the gala dinner venue—the Palais am Funkturm on the Berlin Fairgrounds. Evoking themes from the 1950s that paid homage to when the building was constructed, the audience of more than 500 guests was treated to a lighting spectacle and live performances by musicians, vocalists, and local Berlin artist Helge Leiberg's video paintings.

THE AWARDS

The other focus of the gala dinner was the Professional Lighting Design Recognition Awards. All five categories had an impressive list of nominees and the jury had its work cut out for it in selecting only one winner for each. Best Professional Work was awarded to Speirs and Major for the Grand Mosque in the UAE; the Award for Research and Education was presented to professor Jan Ejhed for establishing the Ph.D. course at KTH, Royal Institute of Technology in Handen, Sweeden; Best Partner in the Industry was given to lighting manufacturer We-ef; the Award for Daylighting was given to the Bruder Klaus Kapelle, a chapel in Wachendorf, Germany, designed by Swiss architect Peter Zumthor; and the Award at Large was given to Lighting Urban Community International (LUCI) for it international efforts to improve urban lighting.

The Lifetime Achievement Award was given to William Lam for his professional achievements in integrating lighting and architecture discussions through his practice, teaching, and writing. Unfortunately, Lam was not able to attend. He was too frail to travel, but he did offer a prerecorded message of thanks along with insightful words about the challenges facing lighting practitioners today.

THIS IS A CONFERENCE, NOT A TRADE SHOW

What makes the PLDC particularly unique is its ability to find the right balance between audience and content. It is a conference in the true sense of the word, where the focus is on the presentations, as opposed to a trade show where everyone is scouting new products. For the 47 manufacturers that did have small booth exhibits, it was a much more relaxed environment where designers could take a quick look at the product displays. Adding to the energetic atmosphere were the substantial number of students and young designers among the conference crowd who created a whole new level of integrated discussion.

A third PLDC will be held in 2011, although the location for that event has not yet been determined. But it was announced that a symposium devoted to daylighting would be held in October 2010 in London.

Overall, the PLDC confirms that there is a genuine interest in, and a tremendous amount of work being done in, the lighting design field and that architectural lighting should be recognized as a global endeavor that is making its way to the forefront of all of today's relevant discussions. **ELIZABETH DONOFF**

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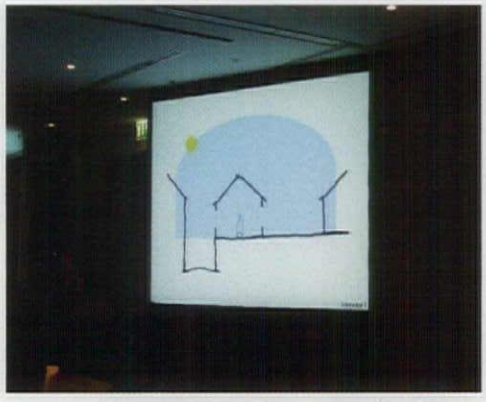
Students Impress at Vox Juventa

The Professional Lighting Design Convention played host to Vox Juventa, a program of papers delivered by students (all under the age of 30) who are enrolled in a lighting design program, an architecture program, or a related discipline. The six student presenters come from around the globe and their work signals the diversity of lighting research topics that are being pursued today. Each student was given a half-hour to present, and then followed that presentation with a few minutes for a question-and-answer period. These sessions were some of the best attended throughout the conference and often were standing room only.

Natalie Bell, a student at KTH, Royal Institute of Technology in Handen, Sweden, discussed her work on "Lighting and the Perception of Safety." Kate Park, a student at Parsons The New School for Design in New York, then presented her project "Light Memorial: Memory in Light." This was followed by Brianna McMenemy's presentation, "Light as a Communication Tool within the Pervasively Developmentally Disordered Population."



Mariana Novaes presents her work on the role of lighting design and its impact on the elderly's perception of space.

(McMenemy began working on this project while she was enrolled at the Parsons' lighting design program, and the project is now the focus of her Ph.D. studies at Penn State University.) Mariana Novaes, a student at KTH, discussed her work on the role of lighting design and how it impacts the elderly's perception of space. Khah-Leang Choon, a student at the University of Technology, Business, and Design in Wismar, Germany, gave a very lively presentation on light in nature and the impact of bioluminescence.

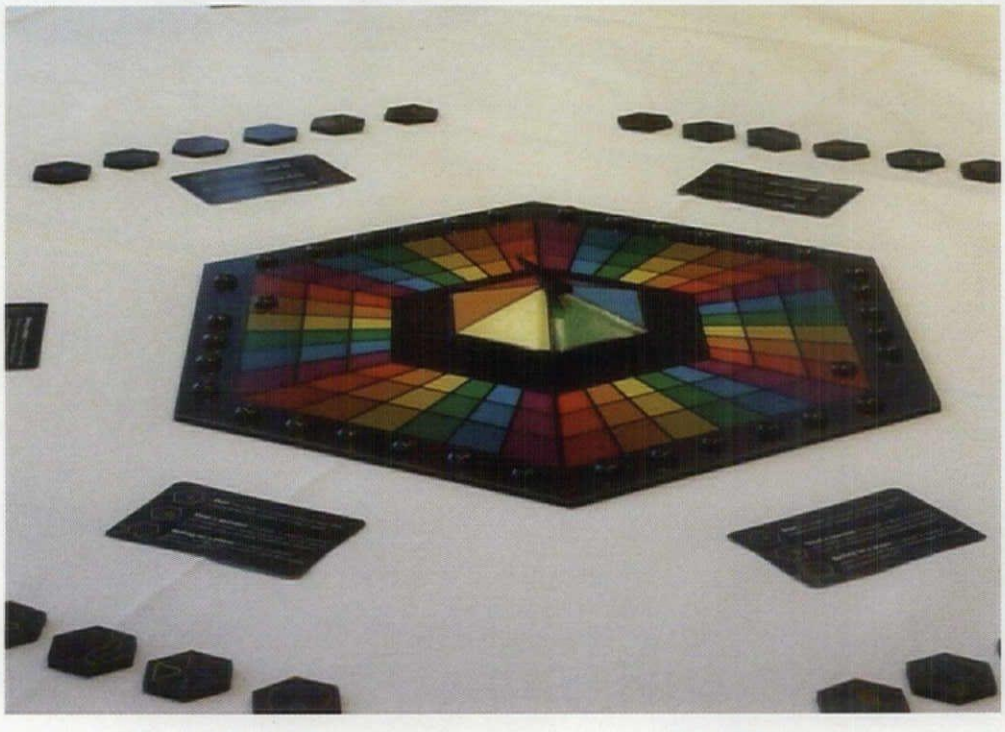
The program concluded with an engaging discussion by University of Wismar architecture student Paul Ehlert who spoke on communicating with dynamic lighting. If ever there was concern about the future of the next generation of lighting practitioners, Vox Juventa is a strong reminder that there is a great amount of talent and inquisitiveness waiting in the wings. **ED**

Game Transforms Studying for Lighting Exams

Studying for exams is never fun, and even less so when it comes to final exams. Is there a way to take the information that students attending the University of Wismar are tested on for the Lighting Science Examination and make it more engaging? That was the question professor Michael F. Rohde, program director of architectural lighting design at Wismar, asked himself. Wondering if it might be possible to turn the materials—more than 400 questions on lighting technology; the history of light; lamps and luminaries; and human perception—into some kind of a game, Rohde approached his colleague, professor Hanka Polkehn, in the communication and graphic design program. Polkehn then assigned the premise as a class project, and two students—Catharina Schimmel and Corinna Reuter—developed the questions into a board game. When played, students forget that they are studying for a lighting exam.

Referred to as "The Game," one to six people can play at a time, answering questions from the deck of 400 cards organized into six color-coded categories: general knowledge, human perception, lamps, luminaires, lighting technology, and the history of light and lighting. A player wins when he or she has moved all six counters (or pieces) three slots on the game board. Adding diversity to the play is a series of action chips, each of which allows the player to challenge another participant and shake up who receives the winning answer.

Currently still a prototype, The Game was played by three teams—a group of students, professional lighting designers, and manufacturers—in a demonstration Oct. 31, after Vox Juventa during the PLDC. Production costs are still being evaluated, but the Professional Lighting Designer's Association hopes to launch The Game as a for-purchase item at Light+Building in April 2010 in Frankfurt. **ED**



ELIZABETH DONOFF

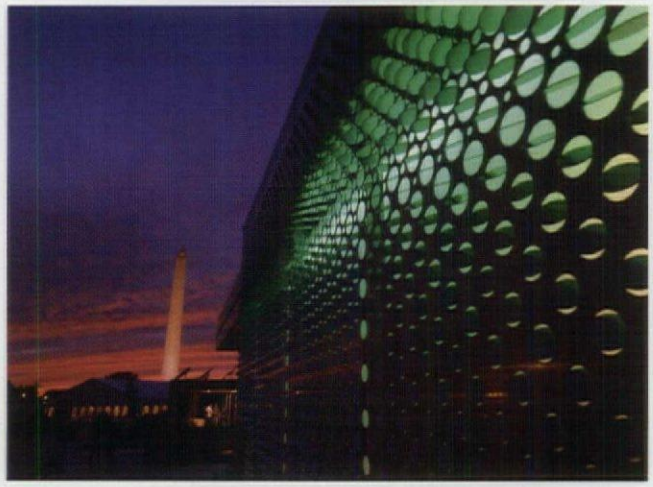
A prototype of "The Game" was on view during the PLDC in Berlin. The board game makes use of the materials students are tested on at the University of Wismar for their Lighting Science Examination.

Solar Decathlon Shines Brightly

To say that the Solar Decathlon is impressive would be an understatement. The 10-day event sponsored by the U.S. Department of Energy has grown exponentially in the course of just five years. Ingenuity, entrepreneurship, and commitment to a renewable future were all in evidence in the 20 student-designed homes on display Oct. 9–18 on the National Mall in Washington, D.C. The time investment and resources put into these projects are considerable, and the process is actually a two-year endeavor that begins long before the houses arrive in Washington. For many teams this is not their first time participating in the by-selection-only event. This was the case for Virginia Tech. Its entry, Lumenhaus, is the most current iteration of design research on green building being conducted in the architecture and engineering programs at the school. Although the house did not place in the lighting contest, the design was the only one to have a nighttime presence with blue and green LEDs backlighting the façade of movable metal panels stamped with a perforated wave pattern.

When it comes to lighting, each of the houses took a different approach. As the title of the event indicates, all of the projects have an awareness about natural light and actively incorporate it into their designs. But when it comes to the integration of electric light it's a little bit more of a mixed bag. As this year's judges—lighting professionals Nancy Clanton, Ron Kurtz, and Naomi Miller—for the lighting portion of the decathlon noted, the teams that had lighting programs at their home institutions had a much better understanding of lighting and how to integrate it into the design of their houses. In making their evaluations for the lighting contest, the judges were looking for the projects that had a residential feel to their lighting strategy. "We were looking for a layered approach," says Kurtz, a design principal at St. Louis–based Randy Burkett Lighting Design. "That means nonuniform illumination to break up the monotony of light."

There are no rules against consulting with lighting specialists in developing the lighting schemes for the homes, but as Sandra Stashik, principal at Philadelphia-based lighting firm Grenald Waldron Associates and lighting judge for the 2005 and 2007 decathlons, says, "While it is helpful for lighting designers to act as technical consultants, ultimately the lighting design needs to come from the students." In many cases, students eager to incorporate new technologies such as LEDs did so, but did so without fully understanding the source as well as the issues of color temperature, brightness, and glare. "They are just restating information that they have either read or a lighting adviser has relayed to them," Clanton says, who is president of Boulder, Colo.-based Clanton & Associates. Most of the teams were quick to point out that they had incorporated LEDs, which appeared to be the illumination source most commonly used in this year's group of entries. Very few teams incorporated other light sources, and when they did it was usually compact or linear fluorescent.



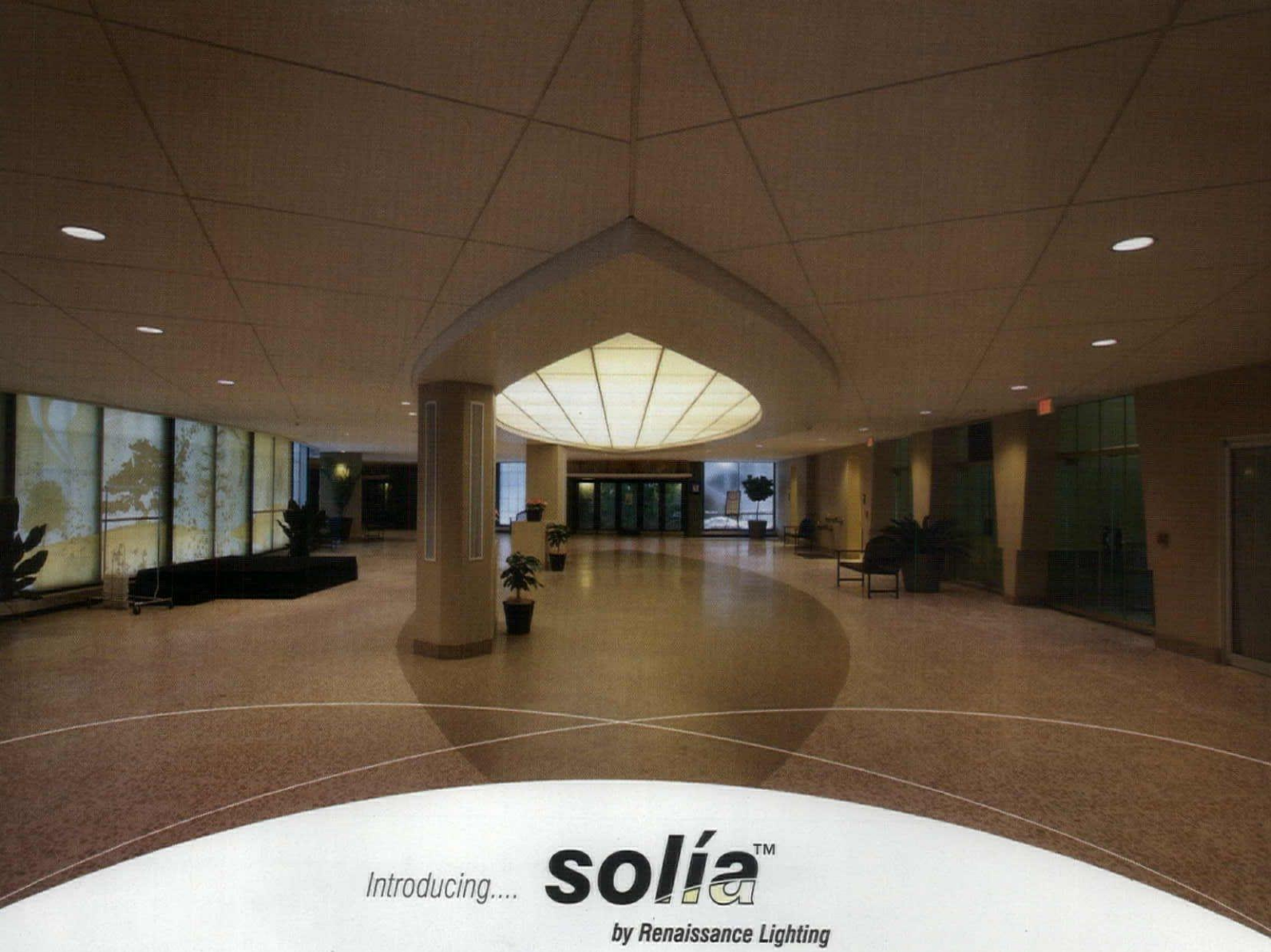
Thousands of spectators visited the 20 student-designed homes on display Oct. 9-18 on the National Mall in Washington, D.C. to view the latest in sustainable and energy-efficient building strategies (top). Virginia Tech's Lumenhaus had a strong nighttime presence with it's LED backlit façade of movable metal panels (above).

The lighting contest winners were not necessarily the teams anticipated to win based on the race for the overall competition. First place went to the University of Minnesota followed by the University of Illinois at Urbana-Champaign in second place, and a tie for third place between Penn State and Team Germany. "Team Minnesota had a nice variety of light sources, LED and fluorescent," Kurtz says. "It looked like a place you would want to live." The lighting jury was impressed with Illinois' exterior lighting and the subtle placement of light sources behind the planks of wood siding on the façade. The effect was simple but powerful as vertical accents of soft light added to the dimension of the building's elevations. The jury appreciated Penn State's use of accent light coupled with ambient light via a clerestory to create an even but layered effect. And even though Team Germany incorporated a dynamic use of LED lighting at night, coordinated into sophisticated color blocking, daylighting was Team Germany's real strength, as its entire façade was made out of luminous panels with embedded solar cells.

Other notable lighting schemes included Team Ontario/British Columbia's design of a double-layered interior/exterior shading system, and Team Boston's Curio House with a linear cove system of LED arrays positioned adjacent to the window blinds to use the fabric as a reflective surface at night to provide additional ambient light.

Many of the houses will return to their campuses to serve as educational laboratories for sustainable design initiatives, and in a few cases the houses have been donated to communities to become permanent parts of larger affordable housing developments. Once again the Solar Decathlon shows the future of sustainability and innovative technologies is bright. For more details about the decathlon go to solardecathlon.org. **ED**

STEFANO PALTERA/U.S. DEPARTMENT OF ENERGY SOLAR DECATHLON



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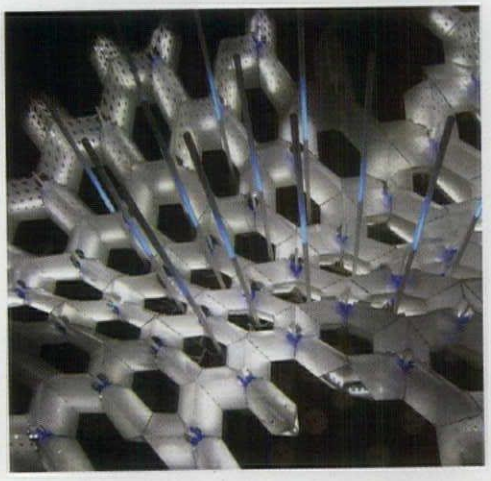
Channeling the Arctic Through Luminescent Skins

The Aurora Project, an exploration of the intersection between energy and ecology, is the work of 2009 Van Alen Institute New York Prize Fellowship recipients Jason K. Johnson and Nataly Gattegno. Johnson and Gattegno are co-founders of the San Francisco–based design and research collaborative Future Cities Lab. During summer 2009, the duo researched the changing Arctic landscape and the effects of global warming on this region. Their findings offer "a speculative vision for a massive new energy infrastructure and settlement pattern," and find form in a series of three installations, which were on view at the Van Alen Institute from Sept. 16 to Oct. 15.

The first installation, "Aurora," is a crystalline structure, pierced by vertical cold cathode tubes and supported by cast plaster footings and delicate metal framework. Viewers trigger infrared sensors connected to the tubes and blue LEDs, causing them to pulse and filter through translucent planes of PETG, the material with which water bottles are made. The ephemeral lighting of "Aurora" mimics the shifting ice shelves of the Arctic.

The second installation, "Terra Incognita," is composed of LED-backlit maps, drawings, diagrams, and other materials found by Johnson and Gattegno that examine "how the Arctic region has been represented, claimed, and mythologized in the past and present." Finally, the third section of the exhibit creates an immersive visitor experience manipulating ice from solid to liquid. The echo of water drops draws viewers toward a dark corner occupied by "The Glaciarium," an instrument that contains a cylindrical ice core enclosed in a plastic outer shell and mounted on a tripod. Sensor-triggered computer-operated LED arrays intensify as a viewer peeks through the small opening on the side of the luminous object. The ice melts and drips—the sound is amplified by a speaker—into a steel cylinder positioned underneath. It is then recycled and refrozen. While the core typically melts in nine hours, viewer interaction can accelerate the process by as much as 300 percent.



Jason K. Johnson and Nataly Gattegno researched the changing Arctic landscape and the effects of global warming for their installation "Aurora," which was on view at the Van Alen Institute this fall.

Through the manipulation of light, The Aurora Project reminds us that our seemingly trivial actions can affect environments thousands of miles away. **MURRYE BERNARD**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Embracing Energy Codes

The Department of Buildings for the city of New York is going to start auditing design submissions and will revoke permits if projects do not meet New York State Energy Code compliance. To educate architects and designers on the new requirements being implemented by the city that are necessary to comply with the state code, the AIA New York, ASHRAE, and Urban Green recently partnered to present a series of energy code training sessions titled "Energy Code: It's the Law" from Oct. 26 to Nov. 4 at the Center for Architecture in New York.

While stringent energy codes ensure occupant safety and benefit the environment, some architects and lighting designers regard codes as barriers to good design. Part two of the series, "Lighting Design and the Energy Code," presented by Hayden McKay and Shoshanna Segal of Horton Lees Brogden Lighting Design, offered design strategies applicable to any city or code. The two lighting practitioners believe it is possible to meet and even exceed code requirements while maintaining lighting quality. One way to address lighting code issues, they point out, is by returning to the basics—namely daylighting. Not only is daylighting energy efficient but it is beneficial to occupants. "Americans spend 85 to 90 percent of their lives indoors," McKay noted. Rather than rely on electric lighting, she suggests that it should be considered supplemental.

Controls are another strategic way to create energy-efficient lighting design. Separately controlled layers of light allow occupants to modulate their environment throughout the day, using natural lighting when feasible. Clearly labeling lighting controls and fine tuning after installation ensures that occupants will be able to properly operate them. Otherwise, McKay says, users will "self medicate" by bringing incandescent lamps to their desks, offsetting any energy savings.

Instead of retrofitting existing lighting systems, which usually are inefficient, McKay advocates starting with a clean slate by "re-lighting." With this approach, a designer can use a little creativity to correct undesirable architectural conditions. For example, punched openings can create stark interior contrast, but you can remedy this problem by lighting the wall space between openings. Designers should light the space first, then accommodate specific tasks, Segal suggests, instead of the other way around. A delicate balance needs to be struck between comfort and stimulation; the absence of shadows is too uniform and in turn is boring.

McKay and Segal advocate using a wide variety of lighting sources and point out that, while the decision depends heavily on the intended application, the most energy-efficient fixture is not always the best. "Be careful not to let technology be the driver," Segal warns. Designers should make lighting an integral part of the project from the start. Rather than passing the task to a consultant, Segal suggests "tailored rather than blanket solutions."

The New York City Department of Design and Construction also has developed a helpful resource, a lighting design guide titled *The Manual for Quality, Energy Efficient Lighting*, that offers practical lighting solutions that can be beneficial to designers in New York and elsewhere. It can be downloaded at nyc.gov/html/ddc/downloads/pdf/lightman.pdf. The energy code training series continues with a second five-part program Dec. 2. For more details visit cfa.aiany.org/index.php?section=calendar&evtid=1230. **MB**

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FOSCARINI MITE SPECIAL FUSION

A special edition of the first luminaire they designed together, Marc Sadler and Foscarini have collaborated on a new version of the Mite floor lamp. The new Mite Special Fusion combines Kevlar and carbon fiber with fiberglass for a slender fixture outline and luminous body. Like the 10-year-old original, the new floor lamp uses a single 150W halogen dimmer bulb and stands approximately 6 feet tall with an 8 1/4-inch round, chrome metal base. Mite Special Fusion is available in yellow and black. *foscarini.com* CIRCLE 125

LITECONTROL AURA

Aura is the latest addition to the company's Cradle-to-Cradle Silver certified Inde-Pendant line of luminaires that are well-suited for lobby, library, and cafeteria applications. The fixture is designed with a steel rim and a white acrylic lens, which diffuses noticeable lamp images. Available in three sizes—small (31 3/4 inches), medium (37 1/2 inches), and large (49 1/2 inches)—Aura's signature element is its ease of relamping. To replace the T8 U-shaped lamp, a mechanical system allows the bottom cover to remain attached to the fixture while the lamp chamber is accessed. The cover then snaps back into place once relamping is complete. *litecontrol.com* CIRCLE 126

PRESCOLITE VIRTUALSOURCE55

The new VirtualSource55 6-inch and 8-inch vertical and horizontal compact fluorescent downlights feature a 55-degree-angle cutoff. The fixture meets ASHRAE requirements aimed to limit a building's total power consumption, with the 8-inch vertical reflector offering 88 percent efficiency. The 55-degree cutoff also provides visual comfort and a reduction in the direct glare that can result from high luminance reflections or an insufficiently shielded light source. *prescolite.com* CIRCLE 127

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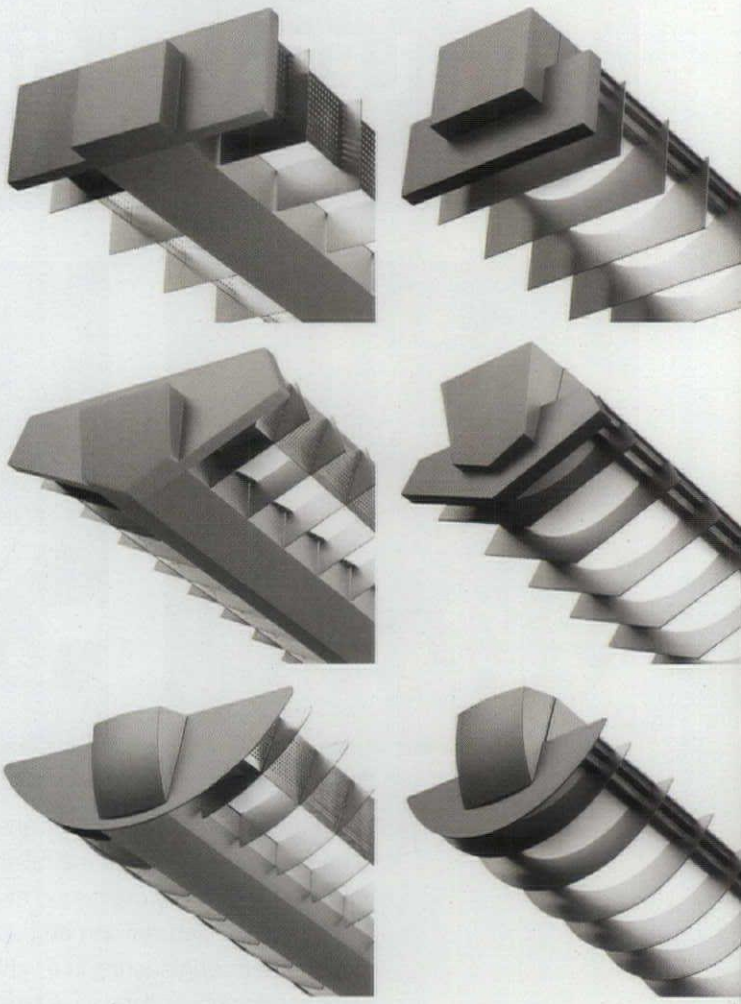
ZUMTOBEL VAETROS

The newest addition to Zumtobel's Waveguide series is the Vaetros indirect light solution. The adjustable luminaire sandwiches a diffuser layer outfitted with the company's proprietary Micro-pyramidal Optic and base to control glare at critical visual angles. Vaetros is available in 4- and 5-foot lengths, in structured and homogeneous styles, and with T5 or T5HO lamps. Multiple Vaetros fixures can be linked together via a continuous run joiner. *zumtobel.us* CIRCLE 129



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The IceTray fixture from Peerless is inspired by the retro-style baffles of classroom environments. Available with three different baffle configurations—rectangular, angular, and curved—the school- and office-applicable luminaires are available in direct, indirect/direct, and perimeter lighting options. The indirect/direct style offers seven different distribution options, from 80/20 to 5/95, as well as three lamp choices with one to four lamps per cross section. The direct luminaire provides light levels also suited for retail and circulation spaces. The fixture can be supsended, surface-mounted, or wall-mounted, and a choice of either a perforated side-shield or opal diffuser creates two distinct looks. *peerless-lighting.com* CIRCLE 130

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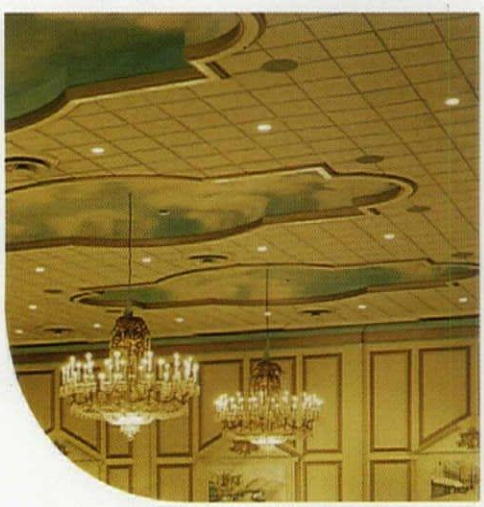

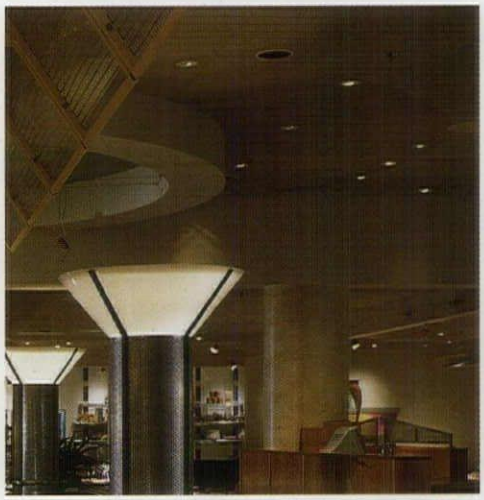

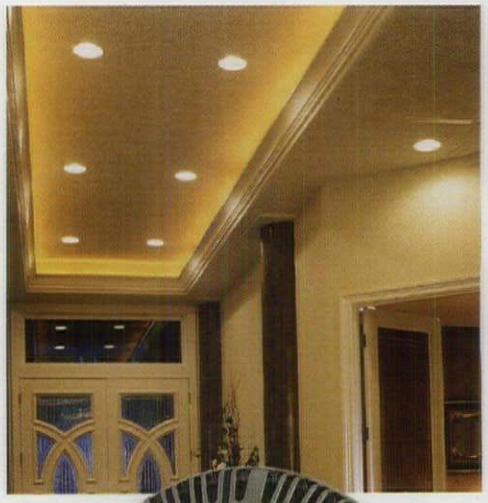

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Incomplete Assignment

AN ATTEMPT AT INTEGRATED LIGHTING FALLS SHORT AT COOPER UNION

The signature architectural space in the Cooper Union's new academic building at 41 Cooper Square is a 20-foot-wide grand atrium stair that rises four stories. Meant to function as a communal gathering place for students and faculty, the stair's proportions are too narrow and too steep to make them a comfortable resting place.

IWAN BAAN

Every once in a while, a piece of architecture comes along that you want to like, but you can't; its execution is just too problematic. The new academic building at the Cooper Union for the Advancement of Science and Art—41 Cooper Square in New York City—is one such project. It's a matter of expectation, really, and it doesn't seem unfair to think that a Pritzker Prize–winning architect—in this case, Thom Mayne of Santa Monica, Calif.–based Morphosis—should have delivered more. Almost everything about this full-block structure, from the circulation to the articulation of the façade, never realizes its full potential. Instead, the building's visitors, and I suspect its occupants, are left wanting more, contemplating architecture that might have been.

The new nine-story, 175,000-square-foot facility challenges the senses, but not always in a good way. To start, the building's zoning envelope was predetermined before the architects were ever selected. The result is a compact structure—100 feet wide by 180 feet long by 135 feet tall, with required setbacks on the north and east façades—that doesn't quite feel comfortable in its proportions and wants to be slightly slimmer and taller. And while 41 Cooper's location, on the east side of Third Avenue between 6th and 7th streets across from Cooper Square and diagonally across from Cooper's 1859 brownstone Foundation Building, does create a greater sense of campus than did the previous building that occupied the site, the architect's attempt to create public spaces is diminished when you realize that "public" means reserved for the Cooper community.

This is a shame when it comes to the building's grand gesture—a 20-foot-wide atrium staircase that rises four stories. Meant to foster an "informal social, intellectual, and creative exchange," this "vertical piazza" is just out of the public's reach and not allowed to fulfill its destiny as a great urban public stair like others in the city, such as the one at the Metropolitan Museum of Art.

Restricted to students, the atrium stair is an overly complicated architectural gesture, and Mayne's desire for people to gather doesn't mesh with the actual proportions of the stair itself, which is very steep. The treads, although standard dimensions, are too narrow to sit on comfortably. Additionally, the areas at the bottom and the top of the stair don't have a sense of place. They're too small proportionally to the stair and not clearly defined, and you don't feel like you have arrived anywhere that has warranted this grand vertical trek.

Architecture and lighting collide in the auditorium (left). Instead of grazing the hand-scrunched screen that lines the walls and ceiling, the lighting equipment is recessed behind the screen creating an uneven and patchy result. However, in the labs (right) and classrooms, lighting and architecture find a happier marriage in an integrated radiant ceiling system, based on a module of 10 feet, 5 inches.

The stair also is the departure point for the building's tenacious relationship with light. The sky-lit volume pretends to be architecture crafted from light, but it is not. Rather, it is the lighting that is being asked to give some clarity to the architecture. Unfortunately, it cannot fill that void.

First, there is not enough contrast on the steps to articulate the different surfaces. Second, the random position of the luminaires makes it difficult to figure out whether light is supposed to highlight the lattice structure that lines the walls of the atrium. Third, poor construction has left the selected spotlights' faceplates exposed instead of being recessed, and the fixtures spaced in a more randomized pattern than originally intended. This makes it impossible to position the fixtures to eliminate all potential views of the source. The Los Angeles office of Horton Lees Brogden Lighting Design, who worked on the project and has worked with Morphosis several times before, selected a relatively new lamp—a 39W R111 metal halide—for its glare control characteristics, as a way to ameliorate the predicament of this challenging layout.

The sculptural lattice—composed of steel pipes covered in glass fiber-reinforced gypsum—lines the north, west, and east sides of the atrium and defines the fifth through ninth floor lobby areas and gathering spaces surrounding the atrium core. The stair appears to be carved out of a block of light—an effect created with linear fluorescent lamps set behind the stair rail panels. The soft glow helps warm the cold palette of the Piranesian space, but also calls attention to a seemingly odd choice regarding the building's circulation: a skip-stop elevator which lets you out only at the fifth and eighth floors. The architect's reason for this is to promote communication and walking. But wouldn't a proper circulation system have encouraged this naturally instead of forcing a specific circulation through the elevator stops?

Another space where architecture and lighting collide is the auditorium. The architect's decision to line the walls and ceiling with a hand-scrunched screen is quite beautiful, but the architecture doesn't leave sufficient space for the lighting. Instead of grazing the ceiling and wall surfaces with a wash of light to accentuate the texture of the screen, the luminaires are located behind the material as if it were a typical ceiling. Complicating the situation is the fact that the lighting, to meet the school's needs, employs two separate systems: dimmable compact fluorescents as the principal light source, and PAR38 incandescents when low light levels are needed or when the house lights need to dim. The two systems are not meant to be used simultaneously, but they are, and as a result the lighting reads as separate patchy spots of warm and cool light. The variation between color temperature is too great and, to someone unfamiliar with lighting, it looks like the wrong lamps were specified.

The areas where the lighting does succeed is where the architecture also is successful, namely in the corridors, labs, and classrooms. For the corridors, which are oriented north-south, continuous linear fluorescent fixtures run the length of the space. Not only does the placement of the fixtures accentuate the building's plan diagram, it also serves double duty, creating a wash of light on the classroom/lab entry walls to highlight display notices or student work.

The architecture finally hits its stride in the labs and classrooms. Because the building structure is a poured-in-place concrete design, the architects lobbied for a radiant cooling and heating system, which allowed them to achieve a 10-foot floor-to-ceiling height and have the radiant panels serve as the finished ceiling. This frees up the mechanical chases on the perimeter for work areas. The labs and classrooms are organized on a 10-foot 5-inch rectangular module and incorporate a T8 direct luminaire along with occupancy sensors, speakers, and fire detectors in the panel connection joint. The building's double skin also is at its most effective here, actually functioning as intended: to modulate the amount of natural light entering the labs by way of a metal scrim with a pattern of perforations in different densities. On the front façade the double skin is a bit precarious, as it pulls away from the secondary glass curtain wall, raising the question of whether it will actually cool the building in the summer months or heat it up.

To achieve the industrial aesthetic that is Morphosis' signature requires a high quality of construction and an attention to detail. Anything less, and the design intent and materials appear sloppy and unfinished. The architectural lighting at 41 Cooper Square often is caught between grand sculptural architectural forms and meeting the functional needs of classrooms and laboratories. The lighting is most successful when it doesn't have to respond to the overly elaborate architectural gestures and can focus on meeting the client's request for a lighting solution that is both energy efficient as well as easy to maintain. **ELIZABETH DONOFF**

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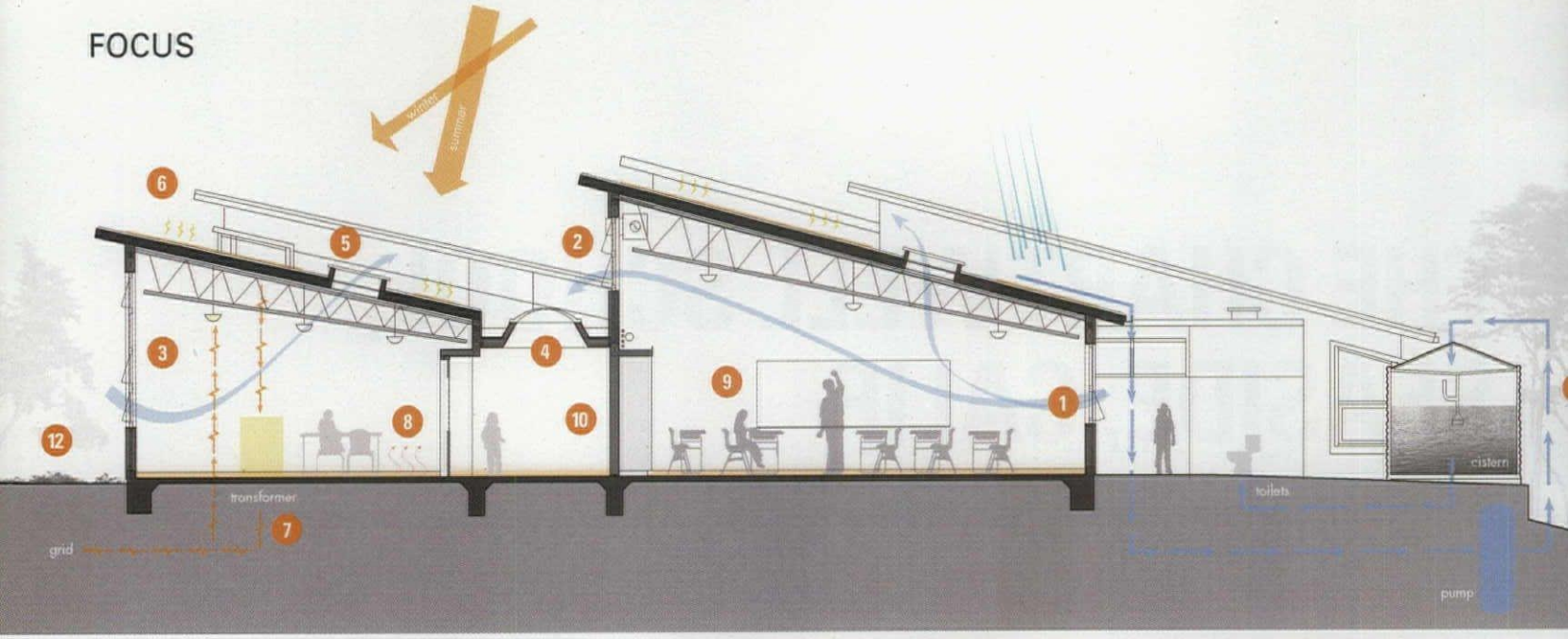
CHALLENGE: TO DESIGN A LEARNING ENVIRONMENT THAT DRAMATICALLY REDUCES A SCHOOL'S ENVIRONMENTAL IMPACT, SERVES AS A TEACHING TOOL ABOUT SUSTAINABILITY, AND INTEGRATES DAYLIGHT TO REACH NET ZERO ELECTRICITY USE

Project The Chartwell School, Seaside, Calif. **Design Team** EHDD Architecture, San Francisco (architect); Benya Lighting Design, West Linn, Ore. (lighting design and collaborating daylighting consultant); Loisos + Ubbelohde Associates, Alameda, Calif. (daylighting consultant); GLS, San Francisco (landscape architect); Sherwood Design Engineers, San Francisco (civil engineer); Taylor Engineering, Alameda, Calif. (mechanical engineer and commissioning agent); Tipping Mar + Associates, Berkeley, Calif. (structural engineer) **Photographer** Michael David Rose, San Francisco **Project Cost** $9.2 million **Project Size** 21,000 square feet **Manufacturers** Bega, Finelite, Greenlee, Halo, Lightolier, Lutron, Shaper

The Chartwell School campus overlooking Monterey Bay takes advantage of its site by creating a series of outdoor spaces to complement the building structures. Light is essential for this K–8 educational facility, which focuses on specialized education for children with learning challenges, including dyslexia, to create a high-performance learning environment.

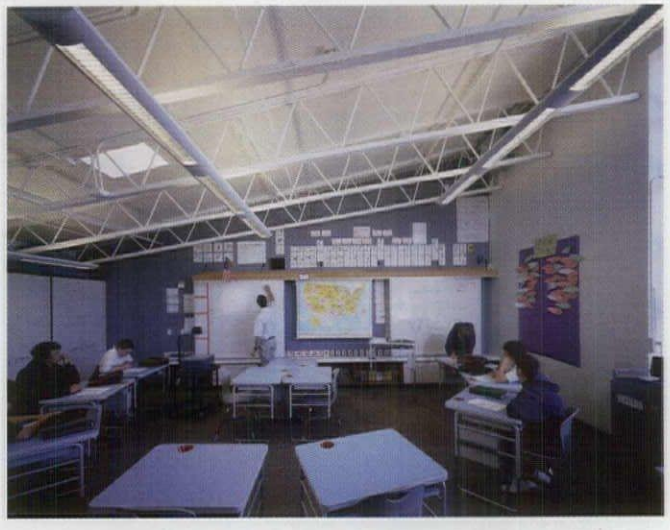


The Chartwell School was recognized by the AIA's Committee on the Environment as a 2009 Top Ten Green project for its sustainable building strategies, which include: 1. Low ventilation intake | 2. High ventilation exhaust | 3. Spectrally selective glazing in thermally broken frame | 4. Daylight in internal hallway | 5. Operable skylight | 6. Peel-and-stick photovoltaics | 7. 30-kW PV transformer connected to electrical grid | 8. Radiant slab heating | 9. Low-emitting materials | 10. Certified wood framing with modular-design walls | 11. Rain catchment system used for toilet flushing | 12. Native landscaping

Sited on the decommissioned Fort Ord military base in Seaside, Calif., the Chartwell Campus is composed of multiple buildings and connecting outdoor spaces overlooking Monterey Bay. Many students commute long distances to attend this K–8 school for its specialized education for children with learning differences, including dyslexia. "The idea was to create an exceptionally high-performance learning environment to give these students every possible advantage as they learn to overcome their dyslexia and return to their mainstream schools," explains Scott Shell, principal of San Francisco–based EHDD Architecture. While there is no evidence that children with learning differences have special lighting needs, "daylighting is an essential nutrient for all students," says James R. Benya, architectural lighting designer and collaborating daylighting consultant for the project. (Benya also is an editor at large for ARCHITECTURAL LIGHTING.)

From the beginning, a key goal of the project was to create a design that would use daylight to illuminate 100 percent of the interior. In theory, this eliminates lighting loads during the day and provides a pleasant atmosphere that strives to improve learning rates. "The daylighting is what primarily shaped the architecture, with large north-facing glazing, and clerestories or skylights on the opposite side of the room to balance the daylight and control glare," Shell says. Many spaces feature glazing on as many as three different exposures to allow natural light into the spaces, a technique Benya describes as "layered daylighting." In addition to providing excellent illumination and natural ventilation, the location and size of the glazing fosters a connection to the outdoors, optimizing views of the magnificent landscape, including its native coastal oak trees.

The Chartwell School's daylighting is so successful that supplemental lighting rarely is needed. A minimal, superefficient electric lighting system is in place for those times when it is. "Designing a building to be net zero means that you must reduce, conserve, and use as little as possible," Benya explains. "Nothing is wasted or gratuitous." To achieve this goal, the classrooms use an integrated lighting system, which combines high-performance direct-indirect pendant-mounted luminaires with high-efficiency super T8 lamps and electronic dimming ballasts. State-of-the-art lighting controls and photo sensors limit fixture output based on the amount of available daylight in the space,



Although daylight is the principal source of illumination for the Chartwell School, an integrated electric lighting system—high-performance pendant-mounted direct-indirect luminaires with super T8 lamps and electronic dimming ballasts—in the classrooms is available for use when required.

and roof-mounted photovoltaic panels generate electricity on-site to offset the remaining electrical demand. The efficient lighting design strategy is a huge success, providing the campus with a 57 percent lighting energy reduction from California Title 24 standards.

Commissioning is a critical stage in the design process for a net zero energy building, necessary to foresee any issues and ensure optimal building function. Despite the elaborate planning that went into the design of the Chartwell Campus, post-occupancy data collected by a Web-based energy monitoring system revealed that the school was not meeting its goal of net zero energy. The culprit? Areas of excess load that had not been factored into the original energy models, such as site lighting that was being left on all night. (This issue was subsequently addressed by instituting a "dark school" strategy to ensure lights are turned off unless absolutely needed for a night event.)

Chartwell's campus was awarded LEED Platinum by the U.S. Green Building Council and was chosen as an AIA Committee on the Environment Top Ten Green Project for 2009. But the biggest reward comes from the glowing reports of the school's students, teachers, and administrators. While the principles of daylighting used here may be elementary, the project definitely is at the top of its class. **MEGAN CASEY**

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Tough Market Awaits

RECENT LIGHTING GRADUATES FIGHT A TIDE OF FEWER JOB OFFERS

MATT WOOD

There is no doubt that the economy has taken its toll on the design and construction industries over the past year, and with it, its job market. Looking for work is always a rigorous proposition, no matter the economic climate, but for graduates entering the workplace now, their job search will be one of the most difficult they experience in their careers.

Prior to the economic crash, soon-to-be graduates in lighting design could expect to receive multiple job offers early in their final year of study, providing them with a choice when it came to selecting a firm they wished to work for. But as the economy has stalled, so, too, has hiring, and the number of job offers aspiring lighting designers can expect to receive are dwindling. Where once lighting students enjoyed multiple offers, now they are grateful for even a single choice. "Across the board the job market isn't what it was a few years ago," says Shadie Wiland, a 2008 International Association of Lighting Designer's (IALD) Education Trust scholarship recipient who studied interior design at Florida State University and is employed with New York–based lighting design firm Fisher Marantz Stone.

Kanis Glaewketgarn, on the other hand, is one of the few exceptions. Glaewketgarn graduated in May 2009 from Pennsylvania State University with an integrated bachelor's and master's of architectural engineering, focusing in lighting design, and had four job offers to choose from. He decided to accept a position with Schuler Shook's Chicago office, where he had interned the previous summer. Glaewketgarn notes that employment was very much on his and his fellow students' minds. "We talked about it all the time," he says. "It was definitely harder to get offers, and only a few of us received multiple invitations."

"IF [LIGHTING FIRMS ARE] NOT HIRING, THEN YOU NEED TO THINK ABOUT ALL THE THINGS YOU ARE QUALIFIED TO DO, WHICH INCLUDES EVERYTHING FROM TEACHING TO WRITING IES FILES THAT OTHER PROFESSIONALS CAN USE, TO SELLING OR SHOWCASING DIFFERENT FIXTURES."

—Atelier Ten's Meghan Smith-Campbell

A drop-off rate in job offers also is being observed by lighting educators. Kevin Houser, associate professor at Penn State (and interview subject of our "One-on-One" article for this month, page 56), sees approximately 10 to 15 or so undergraduate students and a handful of graduate students pass through the Penn State Architectural Engineering program each year. While there is no hard data on how many job offers students have received in past years, Houser says the anecdotal evidence for 2009 suggests their options are quite limited. "My informal sense from talking to students is that where a couple years ago a student may have had four offers, now it's more like they have one or maybe two," he says.

Philip Gabriel, principal of Ottawa-based lighting design firm Gabriel Mackinnon and board member of the IALD Education Trust, estimates that across the globe there are roughly 140 lighting design graduates each year, with 40 to 60 coming from North American programs. Gabriel bases his estimate on the number of students likely to go into lighting design from 11 different programs that offer some type of degree associated with lighting. With that small of a number, it is likely that most graduates will find a job in some sector of the lighting industry, although initially they might have to consider work beyond the traditional path of a design firm and contemplate work with a manufacturer or an energy company.

"There are a lot of different things available to you if you know your stuff," says Meghan Smith-Campbell, a 2008 graduate of Parsons The New School for Design who began employment at lighting design firm Atelier Ten's New Haven, Conn., office. Choices for a recent graduate include working for a manufacturer, a school or university, a publication, a professional organization such as the IALD or the Illuminating Engineering Society (IES), the government, an engineering firm, or an architecture firm. "There's a lot more options, rather than just saying, 'I'm a student, I graduated in New York City, the top five firms that I want to go work for are these,'" Smith-Campbell says. "If they're not hiring, then you need to think about all the things you are qualified to do, which includes everything from teaching to writing IES files that other professionals can use, to selling or showcasing different fixtures."

Lighting design is still a growing field in need of practitioners, educators, and innovators. For those who are trying to land a job, the down economy simply means they are going to have to try a little harder. Both Smith-Campbell and Glaewketgarn had to work to find their employment. Smith-Campbell's strategy was to keep lines of communications open with those professors whose work interested her so that when a position did become available she had an opportunity to interview. Glaewketgarn sought out companies he was interested in, and interned with them.

RESOURCES AND NETWORKING

The basics of job hunting haven't changed over time, but they do need to be adapted for new platforms such as the Internet. Send out cover letters and tell people about yourself, Glaewketgarn says, and follow up by e-mailing a résumé and links to an online portfolio. "I've been telling my friends to reach out to firms because you can't just rely on your school's career fair," he says. "Connections through the IALD Enlighten Conference and Lightfair also help."

Certainly, students with some work experience are more attractive to employers. Derek Porter, director of the MFA Lighting Design program at Parsons, tells his students to focus on getting work. (The program graduates roughly 20 students a year.) "That's the most important thing: Continue your education and get some experience," he says. "The first job you get will not be your last."

To find opportunities for experience, a student has to seek out the right people, make the right contacts, and be aggressive in pursuit. For Fisher Marantz Stone's Wiland, networking was a crucial part of the process. In today's market, that could mean looking past a firm's website that suggests it is not hiring. "Most places don't advertise when they're hiring, especially right now," Wiland says. "It's a matter of getting out there, and really taking that stand to go after the job you want."

Professional organizations such as the IALD and the IES can be good resources for contacts, internships, job banks, and even scholarships. Despite the weak job market, interest in lighting design is increasing. There is a growing public awareness about energy conservation and the role that lighting plays. And that leads Penn State's Houser to suggest it actually may be a good time to be graduating as a lighting designer. "The issues and considerations of sustainability, energy use, and quality of buildings is really something that lay people are thinking about," Houser says. "There are incredible opportunities for lighting, and I think it's something that's in the public's mind more than it ever has been in the past. The opportunity for a young lighting designer—if they don't just think of the next six months, but they think about the next decade—are tremendous. There are wonderful things ahead."

Porter concurs. "Architects are interested in more integrated thoughtful design, owner groups and the public at large are aware of energy efficiencies and economies as well as the qualitative aspects of light," he says. "As that continues to advance, there's going to be more demand on specialists who understand how to apply these qualitative and quantitative measures in an appropriate fashion."

While current job conditions might appear dim, both students and practitioners should be thinking long term. "We've hit a critical mass, where the demand on the profession is going to continue to grow exponentially," Porter says. "We have to get informed people out in the marketplace and be prepared to address the issues." When the economy rebounds, there will be plenty of eager recent graduates ready to take up the mantle of lighting design. **ETHAN BUTTERFIELD**

Web 2.0 and Counting

LIGHTING DESIGNERS ARE BUILDING COMMUNITY ONE TWEET AT A TIME

If there is one thing that remains constant about the Internet, it is the pace at which it changes: Fast. Just when you think you have a lock on one technological advance, something newer comes along. Google trumps Yahoo. Facebook shuts out MySpace.

As daunting as it is to stay abreast of these developments, it's clear that websites, blogs, e-newsletters, and social media platforms are shaping today's business. For those who embrace the Web—lighting designers and educators, manufacturers and sales representatives—its impact goes beyond simply marketing products and services; it's enriching the lighting community with new ideas and connections.

WEBSITES

In our fast-paced world where first impressions carry a lot of weight, a website often is a company's first introduction to potential clients and customers. In fact, they have become a fairly ubiquitous part of present-day business practices as it's now unusual to find a company that doesn't have one. In a community composed of architects and lighting designers, what your Web presence looks like is as important as what it says. For manufacturers, a website also is a way of keeping customers up to date with their latest product offerings and company news. For designers, it's a way to communicate a firm's portfolio. Ultimately, having a website is like having a receptionist on call 24/7 who can answer questions and provide basic information, regardless of what hours your office is open.

BLOGS

First developed as individual personal diaries, blogs now are a quick way for firms to post news and project updates. For example,

Cambridge, Mass.–based lighting design practice Lam Partners launched a blog in June. The firm recently had redesigned its website and brand identity, but it was looking for a more active way to reach a broader audience. Ready-made blogging software eliminates fussing with the HTML code every time you want to change content, and Lam Partners uses Wordpress to run its blog (blog.lampartners.com) as a subdomain of the firm's main site (lampartners.com). Because the software is easy to use, the technology becomes background to its real strength—content.

More in depth than a newsletter and quirkier than a magazine, the blog shows off the firms' personality with articles on sustainable design, daylighting, and a "photo of the month" feature. Marketer Carlene Geraci, an associate at Lam Partners, developed and runs the office blog, but posts are written by everyone in the 15-person office. "The blog is a means of getting our ideas in print. It keeps us relevant and timely," Geraci explains. "What began as an internal thought to educate each other about cool links and new products now reaches an international audience." According to Geraci, clients read and track articles on the site, although she concedes it is too soon to judge if the web traffic is increasing Lam's project list or client base.

If nothing else, the blog ties the firm to the greater lighting community. Lam principal Glenn Heinmiller recently wrote a piece on the energy-efficent Solar Decathlon houses that were showcased on the National Mall in Washington, D.C. (The firm was one of the sponsors of the Team Boston project.) The week-and-a-half long event, hosted by the U.S. Department of Energy, pitted international teams of students against each other. Magazine editors, reporters, and citizen journalists were all on hand to document it on their blogs and Twitter accounts, as were lighting designers such as Heinmiller.

Manufacturers also are using blogs to great effect. One example is lighting manufacturer Lighting Services Inc. Based in Stony Point, N.Y., the company is known for its line of tracklighting products that is well-suited for museum lighting applications. Its blog (blog.lightingservicesinc.com) discusses several recent museum installations that incorporated the company's products. The blog is a helpful resource that goes beyond self-promotion and provides valuable information about the lighting installation and selected luminaires.

ONLINE COMMUNITIES

The social network site Facebook is ideal for building online communities. Facebook friends flock to companies' and organizations' fan pages for events, listings, links, and photographs. For instance, the International Association of Lighting Designers (IALD) has both a fan page and an IALD student group page. When the IALD hosts a conference, the fan page documents and promotes the event. Participants also can use it as a forum to connect with other lighting designers.

The more professionally oriented site LinkedIn helps jobseekers and employeers network, and it is a great resource for getting input from colleagues on important issues using the various discussion groups. Both the Illuminating Engineering Society and the IALD host discussion groups on LinkedIn. While these forums are not active on a regular basis, the posts are a mix of general inquiries and links to articles. There also are LinkedIn groups started around specific topics, such as the lighting educators and researchers group started by Edward Bartholomew, a teacher at the Integrated Design Lab at the University of Washington in Seattle, and the museum and art gallery lighting group, which was started by Lighting Services Inc president Daniel Gelman. "From our standpoint, it's a great opportunity to connect with people we might not have been able to reach before," says Gelman. "It's a way to provide a forum and speak openly."

For quick posts, Twitter seems to have redefined the web landscape. What Twitter does best is real-time "micro-blogging." In 140 characters or less, it connects users who subscribe to "follow"—in Twitter-speak—other accounts. The IALD has a Twitter account (@IALD) and encouraged attendees to "tweet" from the sessions at the IALD Enlighten Americas conference (Oct. 8–10), thus broadcasting ideas and information to the field and to the public at large.

A Visa staffer's son (a young filmmaker in Manhattan) tipped the manufacturer off to Twitter's coolness. Then it took a bit of convincing to get upper management on board.

When ARCHITECTURAL LIGHTING (@archlighting) sent tweets from the Solar Decathalon or provided real time reports from the Professional Lighting Designer's Conference in Berlin (Oct. 28 through Nov. 1) with photos, links, and commentary, followers instantly received the information on their computers and smartphones.

Even manufacturers are getting on board with social networking and are beginning to see its benefit as a way for employees to connect to each other and to customers. "We started out with Twitter a year ago because even though each post is short, you can link back to the website," says Jimalee Dakin, vice president of sales and marketing at Milwaukee-based Visa Lighting. A Visa staffer's son (a young filmmaker in Manhattan) tipped the manufacturer off to Twitter's coolness. It then took a bit of convincing to get upper management on board. There were worries that the platform offered too much transparency, but a report on National Public Radio gave it legitimacy.

With its short posts, Twitter is perfect for mobile devices and effective for public relations and for use by sales personnel, so it is no surprise to find a number of manufacturers such as Peerless Lighting (@peerlesslight), Lighting Services Inc (@LSILighting), and Barbizon Lighting Co. (@barbizon) tweeting away. Dakin uses @visalighting to link up her sales reps in the field. "They can get a tweet on their phone right before they go into a sales meeting. It puts the idea of a new Visa product first thing in their mind," she explains. At Lightfair, the Visa team hosted a "tweet-up," which effectively gathered people at their booth to meet face-to-face.

It's clear that social media's strength as a business practice comes not just from online networking, but also from real world, offline events. "The connected, tech-savvy nature of lighting designers means that practitioners are never far from their handhelds and are hip to anything that speeds up the communication process," says Jennifer Jones, IALD marketing and communications manager. "I don't know that it is changing the profession itself, but it is certainly changing the way its practitioners interact with one another." **MIMI ZEIGER**

Project Princeton's Exterior Pathways: Lighting Analysis and Sustainable Prototypes, Princeton, N.J.

Project Dates Summer 2009

School Princeton University School of Architecture, Princeton, N.J.

Grant Funding High Meadows Fund: Princeton Sustainability Committee, Princeton University, Princeton, N.J.

Faculty Member Paul Lewis

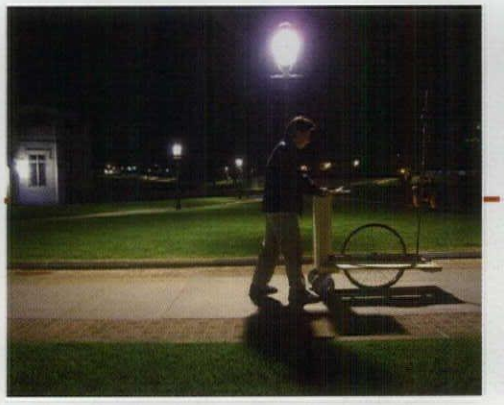
Student Researchers Jean Choi, Yu-Cheng Koh, Thomas Wong

Images Jean Choi, Yu-Cheng Koh, Thomas Wong

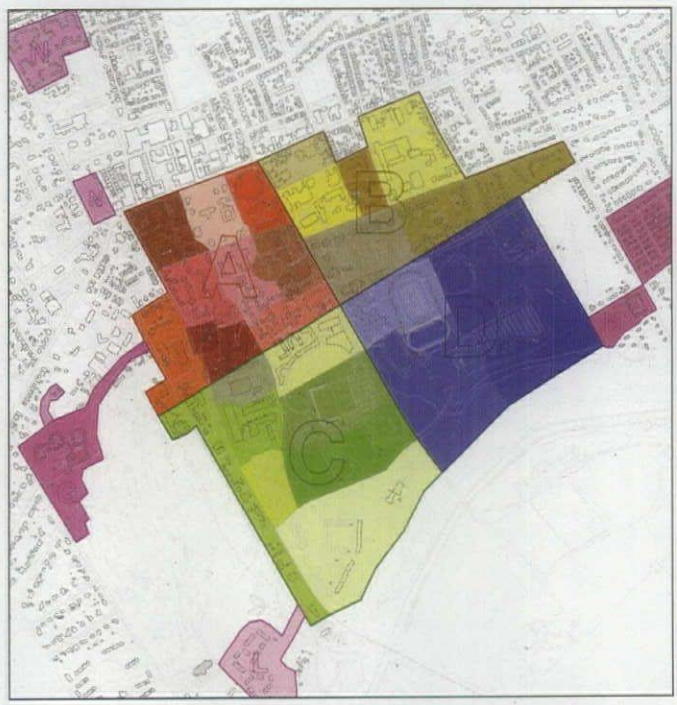
IN A QUEST FOR SUSTAINABILITY, PRINCETON STUDENTS MEASURE THEIR CAMPUS' EXTERIOR LIGHTING

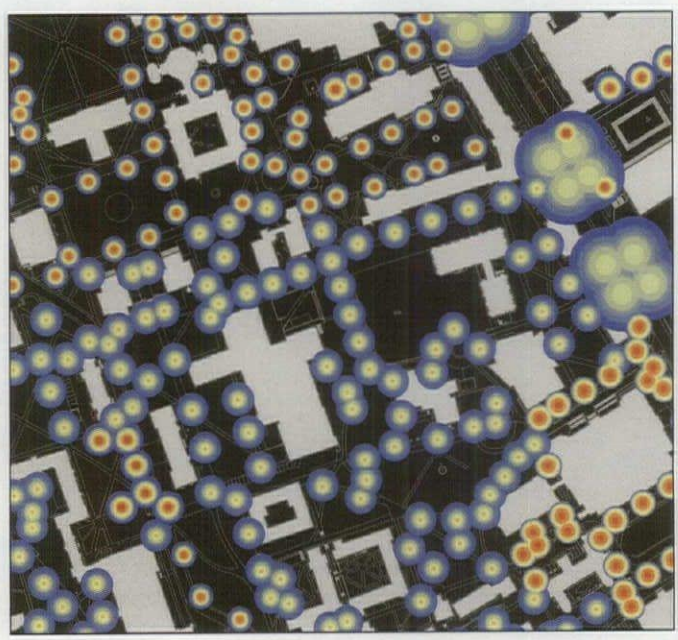
Light Mapping

The Princeton Exterior Pathways project analyzed Princeton University's existing lighting conditions—all 1,720 exterior pathway luminaires (above)—and created a numbering system for the facilities department to use for day-to-day operations. Under the guidance of faculty member Paul Lewis, the team of student researchers—graduate architecture students Jean Choi, Yu-Cheng Koh, and Thomas Wong (top)—spent eight weeks from June to August this past summer conducting field research and mapping light levels. For this, they created a machine they named the Luxmetron (left)—a mobile light measuring device that they rolled across campus and from which they compiled 10,986 readings for their lighting analysis.



Finding the current lamp identification system obsolete, the student research team developed a numbering system and a zoning map that divides the campus into four major quadrants (right). Working in two-hour shifts, the students took light readings from 10 p.m. to 4 a.m. using the Luxmetron, which is equipped with three different light meters to take individual readings at eye level from fore and aft as well as the ground plane. Measurements are taken once every four revolutions of the bicycle wheel, which is approximately every 12 feet (sequence above). The collection of illuminance data enabled the students to prepare a detailed lighting analysis, which included a map of the idealized ground illumination levels (bottom right).



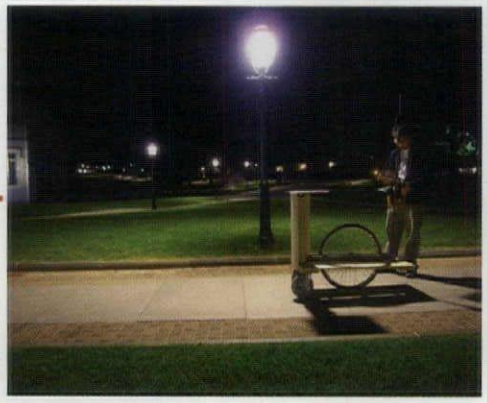


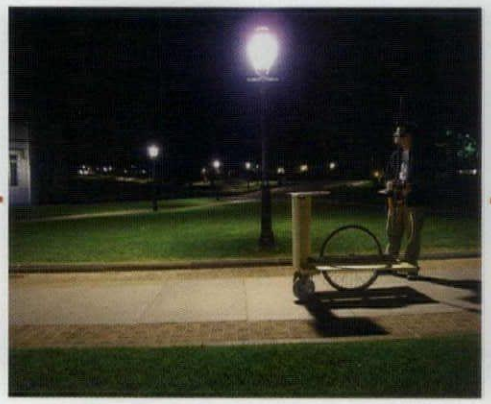
For the past six years, Paul Lewis of the New York–based firm Lewis. Tsurmaki.Lewis (LTL) Architects has taught an Integrated Building Studio at Princeton University's School of Architecture. Along with his colleagues, engineers Nat Oppenheimer of Robert Silman Associates and Mahadev Raman of Arup, Lewis challenges his graduate students to use building performance as a catalyst for design. "Rather than design a building and then see if it works," he explains, "we take structural and thermal issues and use them generatively as a key component in the design trajectory."

It was in this spirit that Lewis wrote a proposal to the High Meadows Fund at Princeton—a philanthropic endowment that offers grants to academic and civic projects that focus on sustainability—suggesting a study of the contradictory pressures put on Princeton's campus lighting. There is a desire for more light to facilitate nighttime activities and improve safety on campus. That creates a demand for more electricity, which is the opposite of the university's sustainability plan. In fact, the light levels on all of the campus' exterior pathways had never been measured. No one could empirically say where there wasn't enough light, or where there was too much. According to the proposal, measuring these conditions and comparing them with factors such as watts used and crime statistics could prove useful to the school's green aspirations while also improving campus quality of life.

Lewis' proposed project also had an educational component. It would have master's students in the architecture school work with the university's facilities department and the campus architect. "My hope was that the project would give the students a greater knowledge and understanding and, frankly, capacity to think about lighting and how it affects perception," he says. "At LTL we often become lighting designers as well as architects. It's integral to design. But lighting can be easy to miss. It's so ubiquitous, something that you see everyday that it becomes invisible. I wanted the students to give close scrutiny to this aspect of spatial experience and become much more conversant with it, to the point that they could see the nuanced differences."

The Princeton Sustainability Committee chose to fund the project and Lewis hired three graduate students for eight weeks from June to August this past summer to conduct field research and study alternative strategies for the university's exterior lighting. The first step was

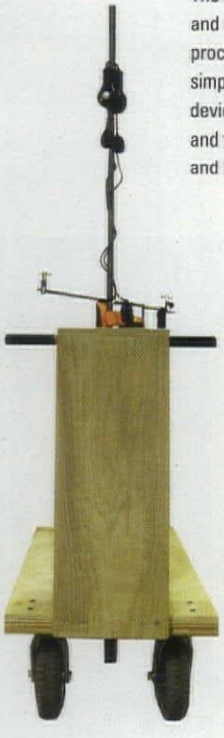


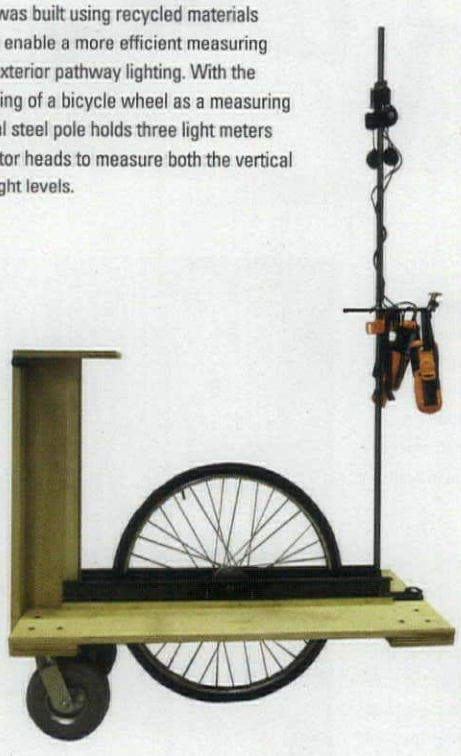


to understand Princeton's existing luminaire and lamp equipment. The students worked with the facilities department to identify each of the campus' 1,720 exterior pathway lights. These lights include three different generations of pole types and feature myriad pole heights and lamp types, including mercury vapor, metal halide, high-pressure sodium, and induction. Finding the current lamp identification system obsolete, the students developed a new numbering system and zoning map that divides the campus into four major zones. Before, lamps were identified by their proximity to certain campus landmarks, such as "North of Spelman," or "South-East Entrance of Whitman," but the student-generated system assigns each light its own number within its quadrant. The facilities department is adopting the system so that it will be easy to report a lamp outage by the fixture's printed ID number.

The bulk of the research involved mapping and recording existing light levels. The students used off-the-shelf light meters in conjunction with a custom-built machine they call the Luxmetron, a homemade device that is basically a plywood cart on two casters and a repurposed bicycle wheel. A handlebar at the back of the cart is used to push the device, and a steel pole located at the front of the cart supports two light receptors. At 5 feet 6 inches above the ground, these receptors read light at eye level from fore and aft. A third receptor at the base of the pole determines the visibility of light levels at the ground. Each receptor feeds into a separate light meter and measurements are taken once every four revolutions of the bicycle wheel, approximately every 12 feet. Each night for one month from 10 p.m. to 4 a.m., the students worked in shifts, wheeling the Luxmetron around campus taking readings. (The rest of the group's time was spent preparing the identification/zoning and analysis for the final report.) In total, they pushed their "mobile light machine" 124,748 feet and compiled 10,896 readings.

The students entered their findings—footcandle readings as well as pole and lamp types and wattages—into a geographical information system (GIS) database that they set up with help from Michael Tantella, a consultant engineer based in Philadelphia. The GIS created a map rich with easily legible information. Light levels were compared with





The Luxmetron was built using recycled materials and designed to enable a more efficient measuring process of the exterior pathway lighting. With the simple repurposing of a bicycle wheel as a measuring device, a vertical steel pole holds three light meters and three receptor heads to measure both the vertical and horizontal light levels.

PARTS

VERTICAL READING RECEPTOR HEADS

Positioned at eye level (5 feet 6 inches), two receptor heads read light levels to measure face visibility along the exterior paths. The two measurements are averaged to determine overall vertical visiblity at any given point.

LIGHT METERS

Three light meters record the data from the receptor heads.

MEASURING WHEEL

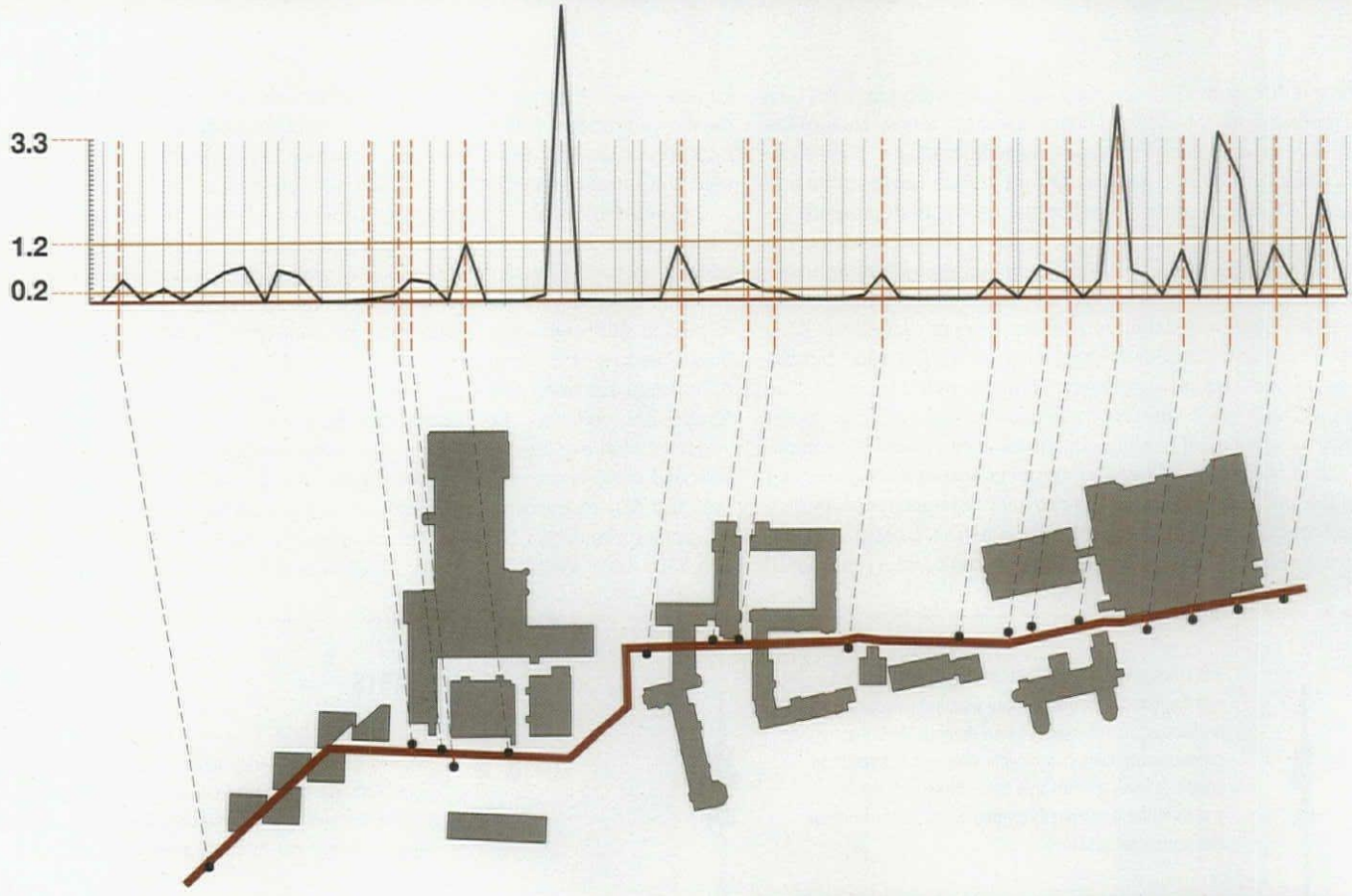
Measurements are taken once every four rotations of the wheel, equivalent to 12 feet.

GROUND READING RECEPTOR HEAD

One receptor head reads light levels for the ground plane. This measurement determines the visibility of the path/ground at any given point.

INFORMATION BOARD

Both portable desk and handle bar, the information board provides a surface on which to take notes.



The students pushed the Luxmetron a total of 124,748 feet to document all the campus paths. A sectional analysis of one of the east-west paths across campus (above) plots the light intensity range—from 0.2 to more than 3.3 footcandles—of the exiting pole luminaires. A lighting analysis map (facing page) shows the ground illumination raster and light meter values. Light levels varied widely, from as little as 0.01 footcandles, as noted in blue, to as much as 9 footcandles, as noted in red. As part of the their proposal for a more energy-efficient campus light strategy, the students suggested a new type of luminaire that would reflect light from the luminaire head onto the pole and create a more ambient type of light with less glare for pedestrians (right).

incidents such as crime statistics—including theft, vandalism, and assaults—and bicycle accidents.

While the team didn't discover anything startling from this data, an examination of electricity use proved more fruitful. The campus' lighting fixtures draw a range of power, from 85W to 1,000W. The most efficient of these lamp types is induction, and the students calculated that switching all of the school's fixtures to this would produce a savings of 38,210W—the equivalent of removing 382 100W incandescent lamps.

Halfway through the project, Princeton hired New York–based lighting firm Fisher Marantz Stone to complete a lighting master plan for the campus. The extensive field research produced by this project will provide essential data for more detailed design and master plan approaches for the campus. Furthermore, the data now gives the facilities and security departments tangible metrics about the campus.

An added value of the exercise is what the students will take away. "Having come into the project with no previous experience or knowledge in the field of lighting, it really was an eye-opener," says graduate student Yu-Cheng Koh. "It made me realize that there are many contributing factors beyond the measurable ones. Pure numbers and statistics can only approximate the often-subjective experience lighting produces on architecture. This confluence of lighting and architecture is definitely something that I would like to explore further." **AARON SEWARD**

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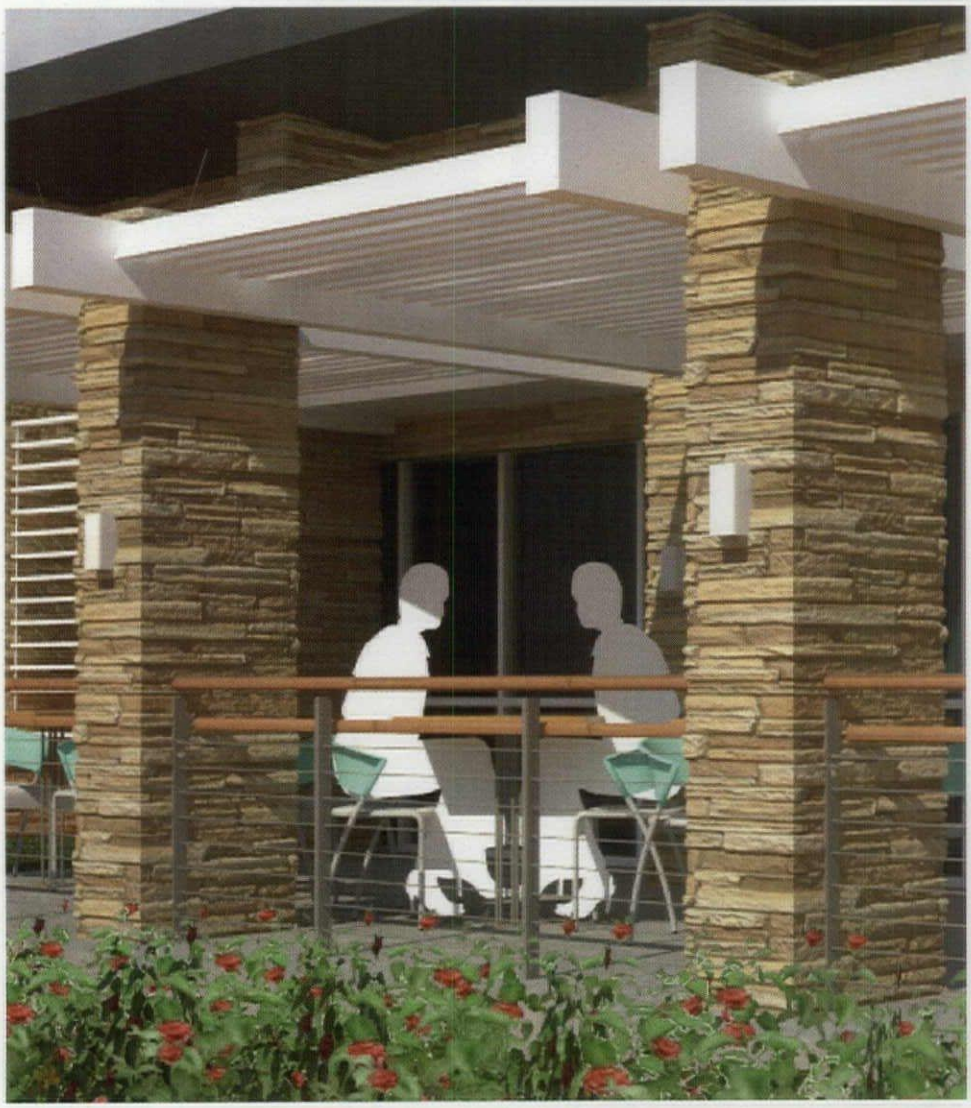
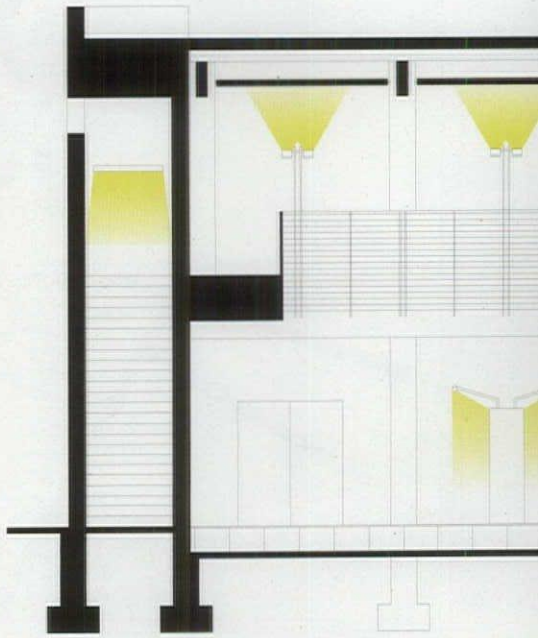


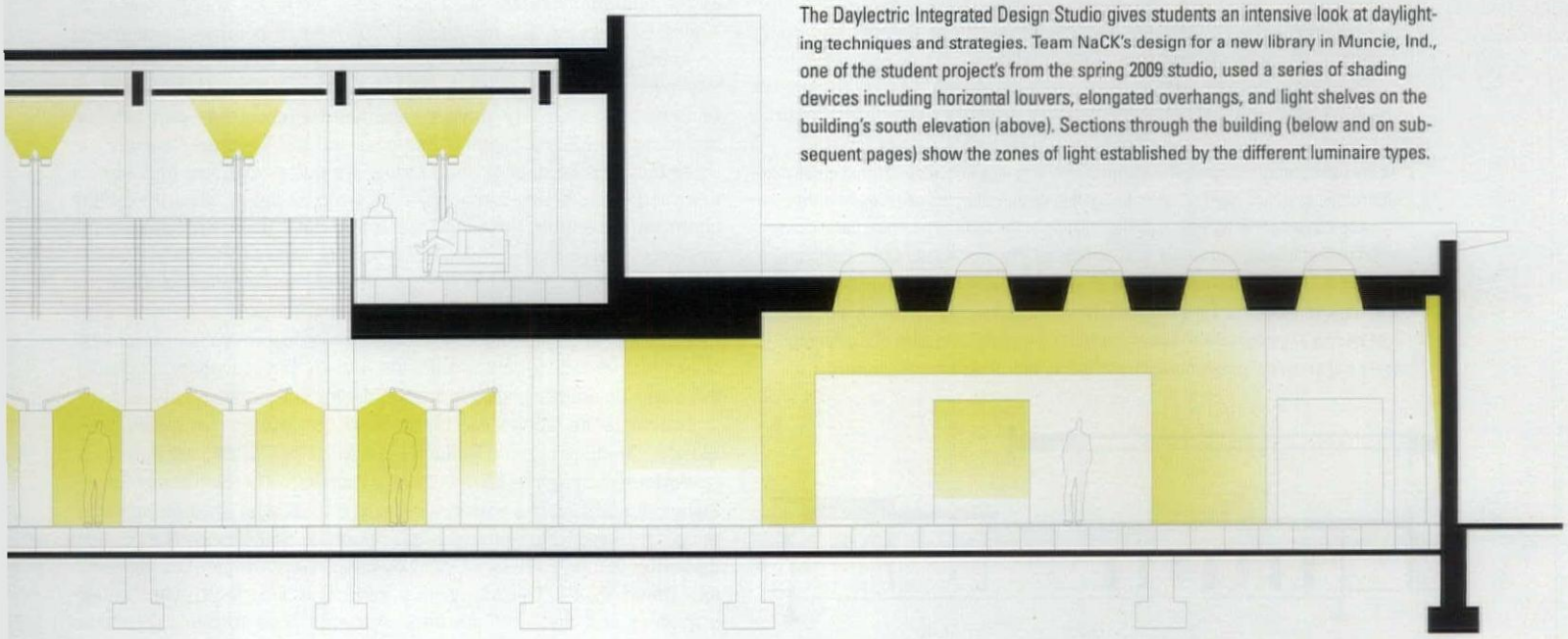
Under the Microscope

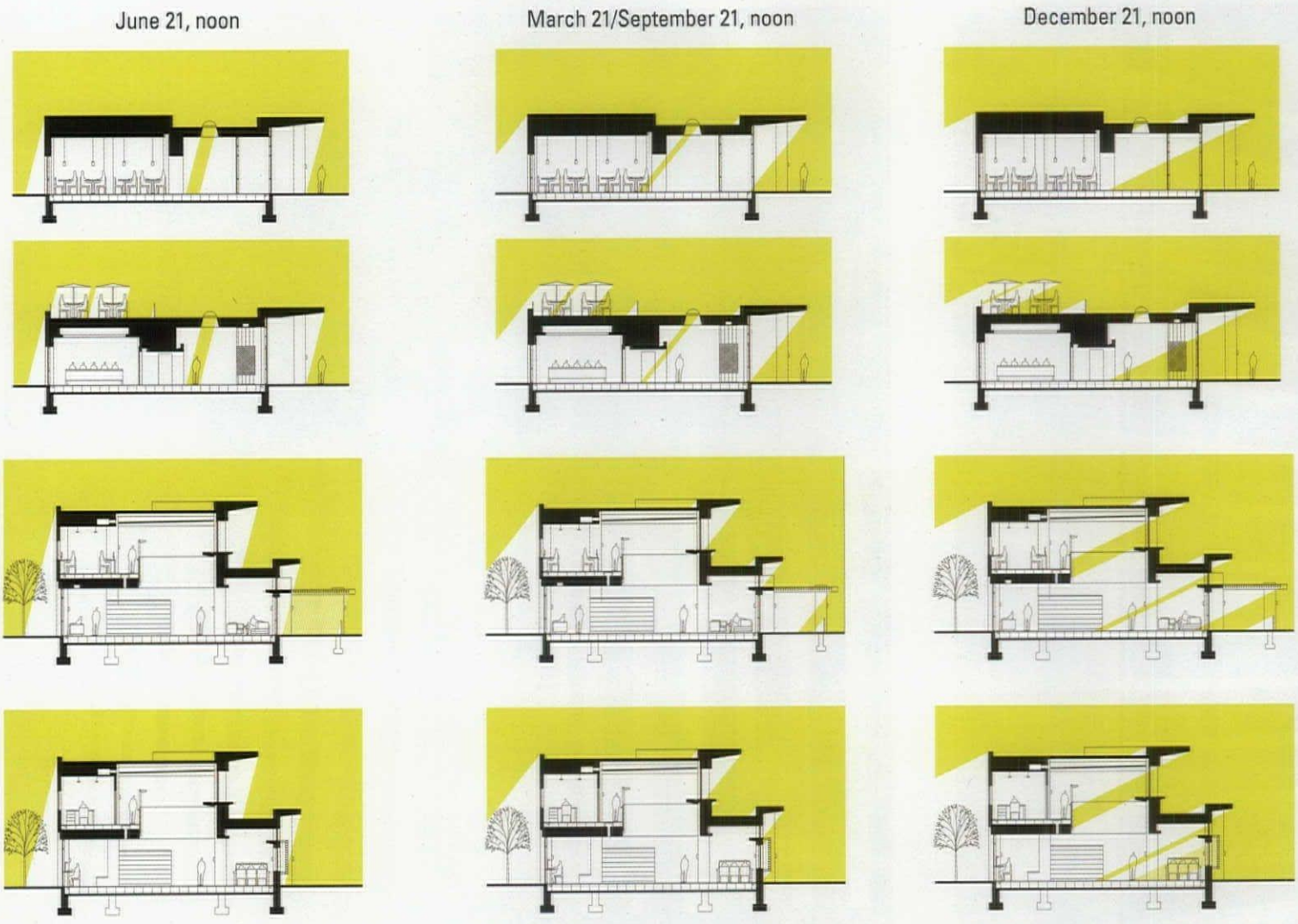
An architecture studio offers students an intensive look at what it takes to actually implement an integrated daylighting design

Studio Daylectric Integrated Design Studio
Semester Spring 2009
School Ball State University, College of Architecture and Planning, Center for Energy Research/Education/Service (CERES), Muncie, Ind.
Faculty Members Professor Robert Koester, director of CERES; Professor Robert Fisher and Jeffrey Culp
Visiting Critics James R. Benya, David Eijadi, Joel Loveland, Gary Steffy, Paul Zaferiou
Students Team NaCK: Nick Alexander, Kate Lengacher, Chris Rhoads
Images Courtesy of Ball State University



The Daylectric Integrated Design Studio gives students an intensive look at daylighting techniques and strategies. Team NaCK's design for a new library in Muncie, Ind., one of the student project's from the spring 2009 studio, used a series of shading devices including horizontal louvers, elongated overhangs, and light shelves on the building's south elevation (above). Sections through the building (below and on subsequent pages) show the zones of light established by the different luminaire types.

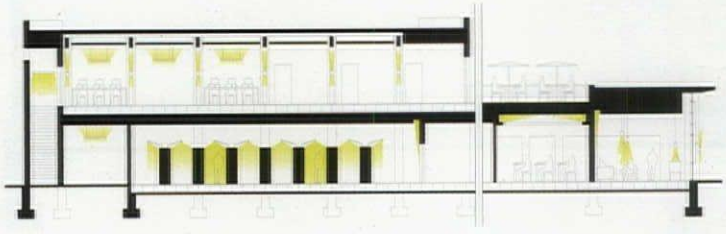




A focus on daylighting often is not a part of an architectural curriculum. But the Daylectric Integrated Design Studio, offered at Ball State University's College of Architecture and Planning, shows that the integrated approach of lighting and architecture can be a richly rewarding course of study for students and faculty alike.

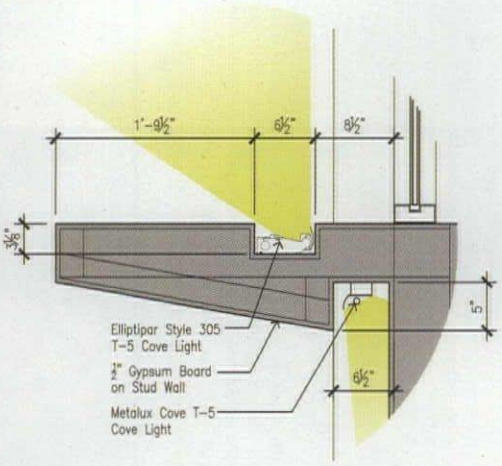
The studio, which was launched in 2006 with a $20,000 grant from the Nuckolls Fund for Lighting Education, was offered for the third time this past spring. The 15-week, semester-long comprehensive class is a natural outgrowth of professor of architecture Robert Koester's work as the founding director of CERES—the Center for Energy Research/Education/Service, an independent body in the university focused on energy and conservation issues. Staffed by architects, the university-level group has collaborated with other departments—such as technology, psychology, physics, and natural resources—and schools, including the Miller College of Business and the Teachers College.

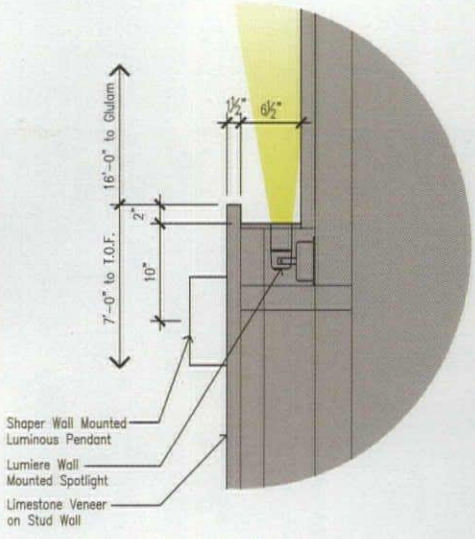
As the semester progresses, the students, working on a schedule of three-week mini charrettes, establish highly developed lighting designs that include diagrams that map the movement of light through the building at the summer solstice, vernal and autumnal equinoxes, and winter solstice (above). The final weeks of the studio are devoted to luminaire selection and the design of a custom fixture. Preparing detail drawings, whether it be for a covelight (facing page top), or a custom library stack light (facing page center and bottom), enables the students to think at a different scale and understand how the light is interacts with materials and furnishings.

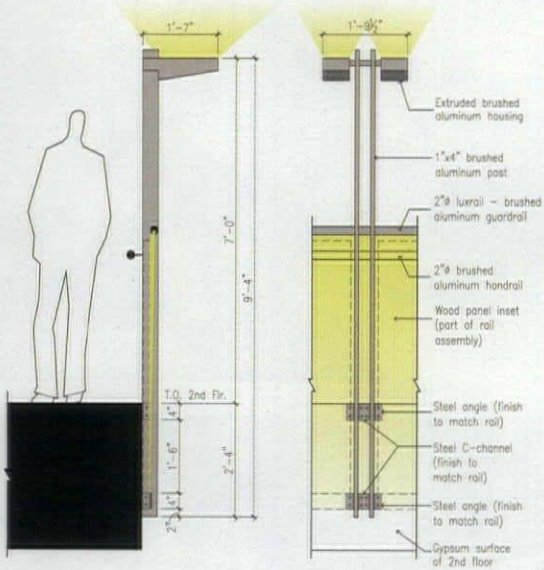


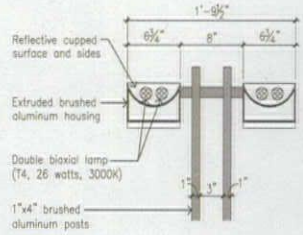
Its facilities for daylighting studies are quite extensive and feature a testing deck, a ring heliodon, a tabletop heliodon, an artificial sky chamber, a mapping table, and a computer lab. In its early years—the post oil embargo days—"the CERES testing lab was one of the first five in the country accredited by the Solar Rating and Certification Corp. for determining the efficiency of solar collectors," says Koester, who notes that CERES' entrepreneurial bent leads to a constantly changing roster of work for various groups inside and outside the university. Currently, it focuses on empirical evaluations of design-for-sustainability.

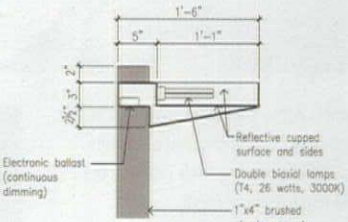
Koester is the faculty lead for the daylectric studio that meets every Monday, Wednesday, and Friday. He is joined by CERES staff members, operations manager Jeffrey Culp and professor of architecture Robert Fisher, in addition to a roster of visiting critics, who are a group of notable lighting and architectural practitioners from across the country including James R. Benya, Joel Loveland, Gary Steffy, Paul Zaferiou, and David Eijadi. The studio is a vertical mix of fourth-year undergraduates and first-year graduate students. The spring 2009 studio

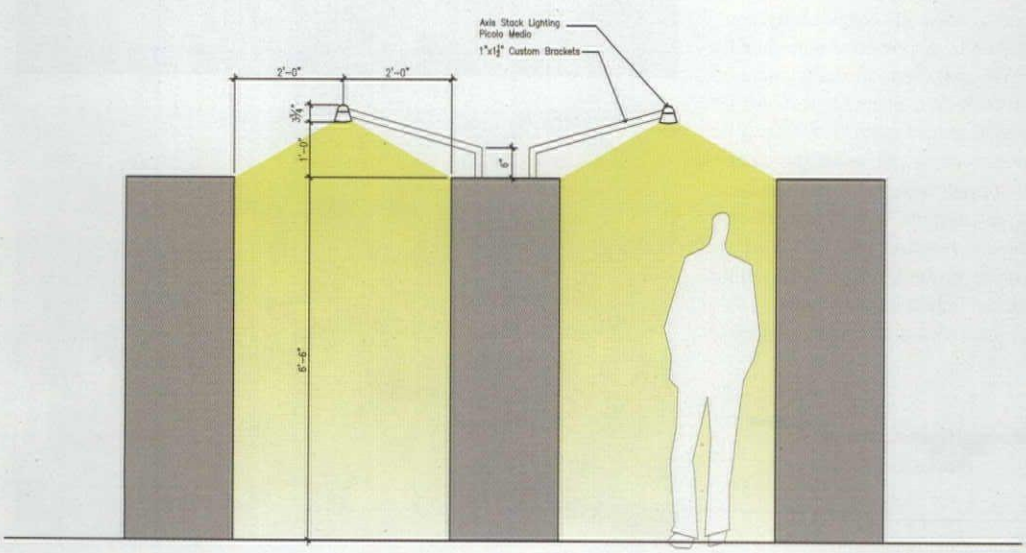










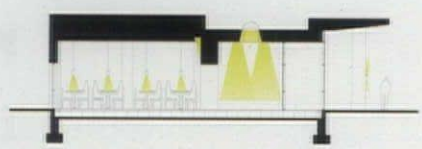


had 14 students, separated into teams of two or three, each tackling the studio project: the design of a 6,800-square-foot, two-story library in downtown Muncie, Ind. "Most team projects aren't structured in a way that frees students to be productive," Koester says. However, to ensure the students' success in this rigorous and fast-paced studio, the Ball State professors have developed a strategy that establishes clear presentation and submission requirements at the beginning and breaks the semester into a series of three-week charrettes. If a group fails to collaborate productively, they won't meet the deadlines. "They're in a [constant] mini-charrette mode," Koester says. "At the end of each three weeks, they have a level of achievement as a team, which is rewarding."

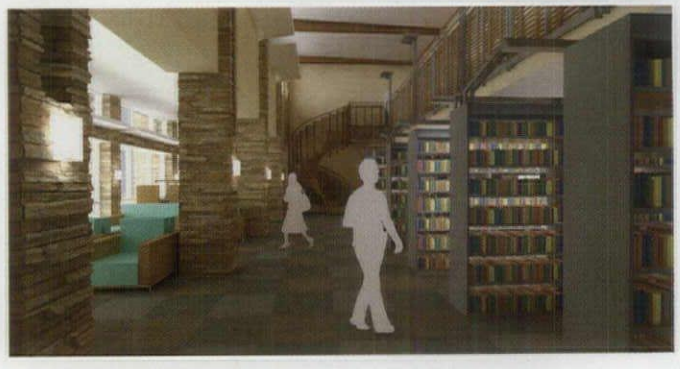
Organizing the studio into three-week segments streamlines the design process, pushing the students to establish their building concepts quickly. The teams have three days to develop the parti, and then they need to focus on the lighting issues in detail. Schematic designs are developed from a menu of building options, which include three basic building footprints, a series of generic structural systems, and material palettes. The choices are purposefully specific and limiting so the students can make their basic design decisions quickly in order to dive into an advanced level of project detail. Although the students assemble their buildings from a kind of kit of parts, nothing is made easy, and they still have to figure out how all the pieces connect.

Of the five projects from the spring 2009 class, the design from the group referred to as "Team NaCK" (an amalgamation of the students' names—Nick Alexander, Kate Lengacher, and Chris Rhoads) was particularly accomplished and its development instructive of the studio's overall process. Team NaCK's two-story structure is organized around a series of limestone piers, creating a layered southern façade that mediates daylight through the shaded canopies the piers support. Breaking the singular building volume into two helps position the structure so as to differentiate between morning and afternoon light on the exterior as well as interior spaces.

Understanding how light interacts with the architecture, and moves through the building apertures at various times of the year, begins in the early stages of the design. The teams build physical models of a sample space and gather



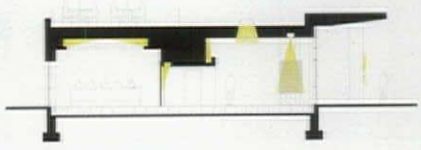
Using AGi32, a software tool for daylight and electric light simulation, Team NaCK rendered its building so it could better understand how its architectural decisions were impacting their lighting choices. Here is a view of the entry area (above), the library stacks (right), and the entrance and public plaza (bottom right).



empirical data using the center's daylight chamber and heliodon. Light measurement instruments connected to a computer allow the students to generate spreadsheets that map the light in the space. Daylighting goals and objectives also are resolved through sectional building development and the modulation of wall openings and angles.

These early exercises using physical models are followed by computer modeling and rendering using AGi32, a powerful software for daylight and electric light simulation. "We give them one long weekend to learn AGi32," Koester says. "They pick it up quickly." It was during this stage of the project that Team NaCK team began developing its building cross section to utilize the reflective properties of the selected materials (limestone, beechwood, copper, terra-cotta, stucco, and brushed metal) to respond to daylight distribution. "The railing system on the second floor changed dramatically based on realizations they made about its transparency," Koester says. Eventually this building element was designed to integrate custom light fixtures as well.

The next stage of the studio project incorporated the team's electric



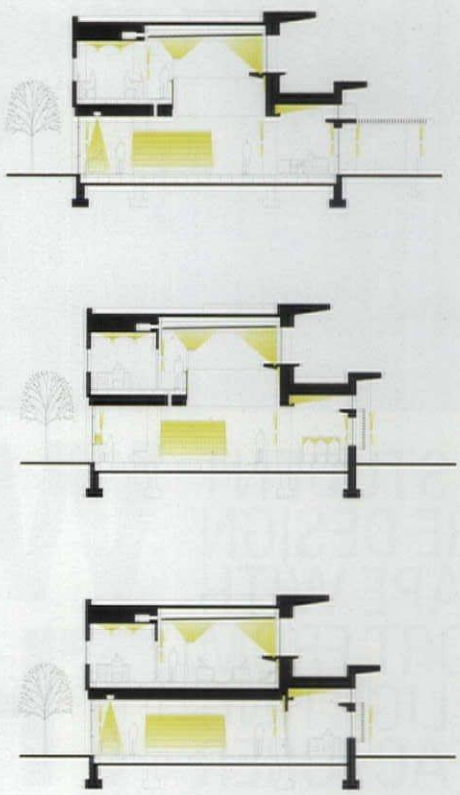
lighting objectives with detailed sectional drawings, reflected ceiling plans, and luminaire selection. Koester points out that the student's initial assumptions about the lighting and light fixtures included patterns and placements that are obviously architectural—in line with columns, for example. But as the Team NaCK students prepared their computer simulations, they discovered that placing luminaires under a beam didn't provide sufficient illumination. Rather, the beam acted as an obstruction and shadowed the ceiling surfaces. "They realized the architectural gesture had to respond to the more substantive lighting gesture," Koester says. In turn, they kept their light fixture design but moved it by half a bay so it could light the ceiling surface.

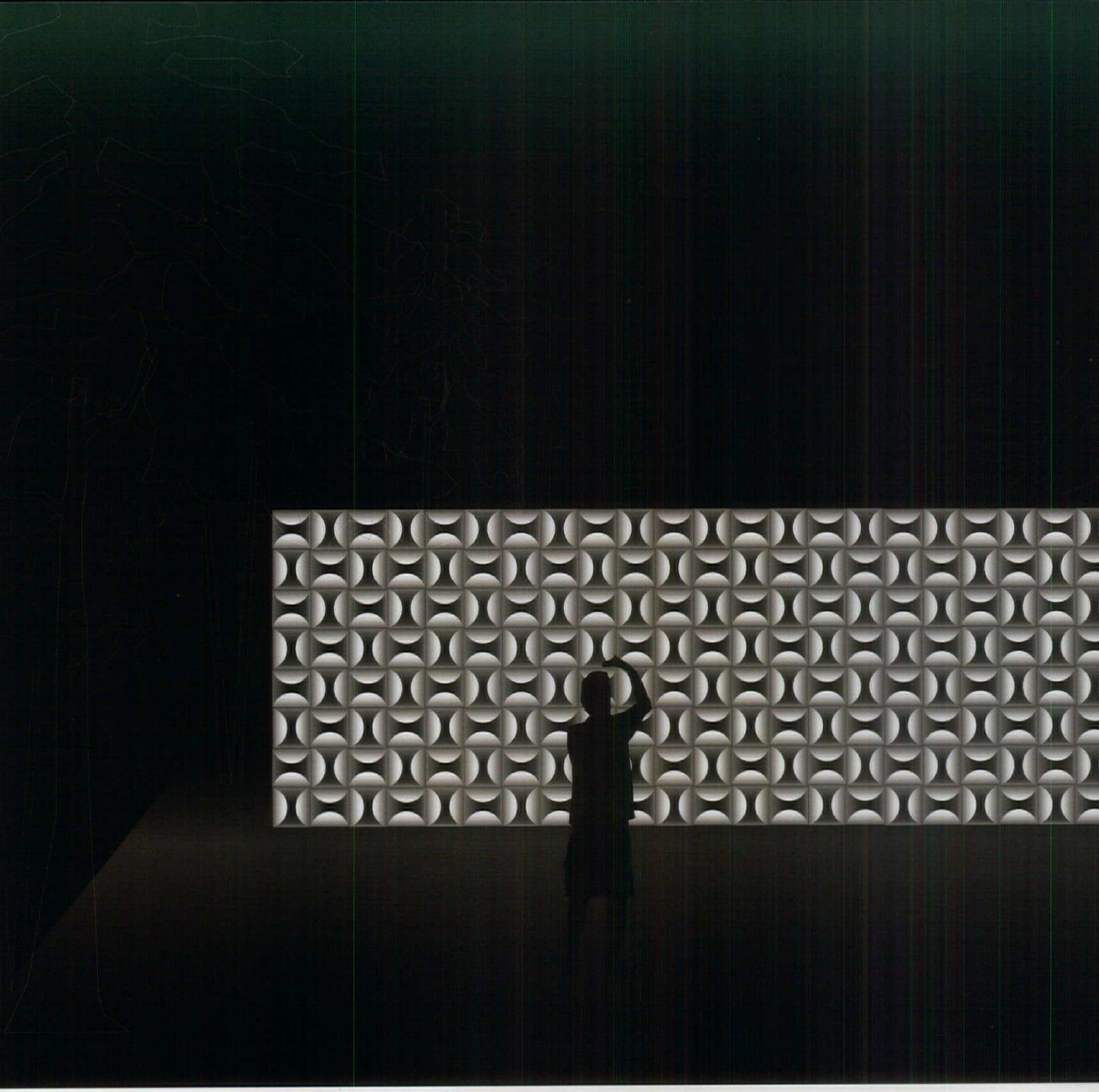
At this point, it would seem that Team NaCK's design was complete, and by most standards it would be, but this is where the daylectric studio approach differs most from a typical studio. "There are many more cycles to go," Koester told the student teams.

Next up was the development of complete control systems that provide switching scaled to the activities in a space and are modulated relative to the amount of natural light. Additionally, using LEED as a guide, the students established energy and power budgets to evaluate just how much more work was required to bring their luminaires, controls, and energy budgets into alignment. Ann Arbor, Mich.–based lighting designer Gary Steffy was present for these classes and offered insights on solving the complex variables.

The final level of project documentation is remarkable—far more detailed lighting schemes than many practicing architects might produce in a career. "We emphasize that this class is not just about how to calculate a footcandle," Koester states. "This is about architecture." By creating an intensive studio environment where the students need to constantly re-evaluate their evolving designs against empirical lighting data—from daylight to luminaires to control systems to energy usage—Ball State University's Daylectric Integrated Design Studio students see architecture in a far more sophisticated light. **EDWARD KEEGAN**

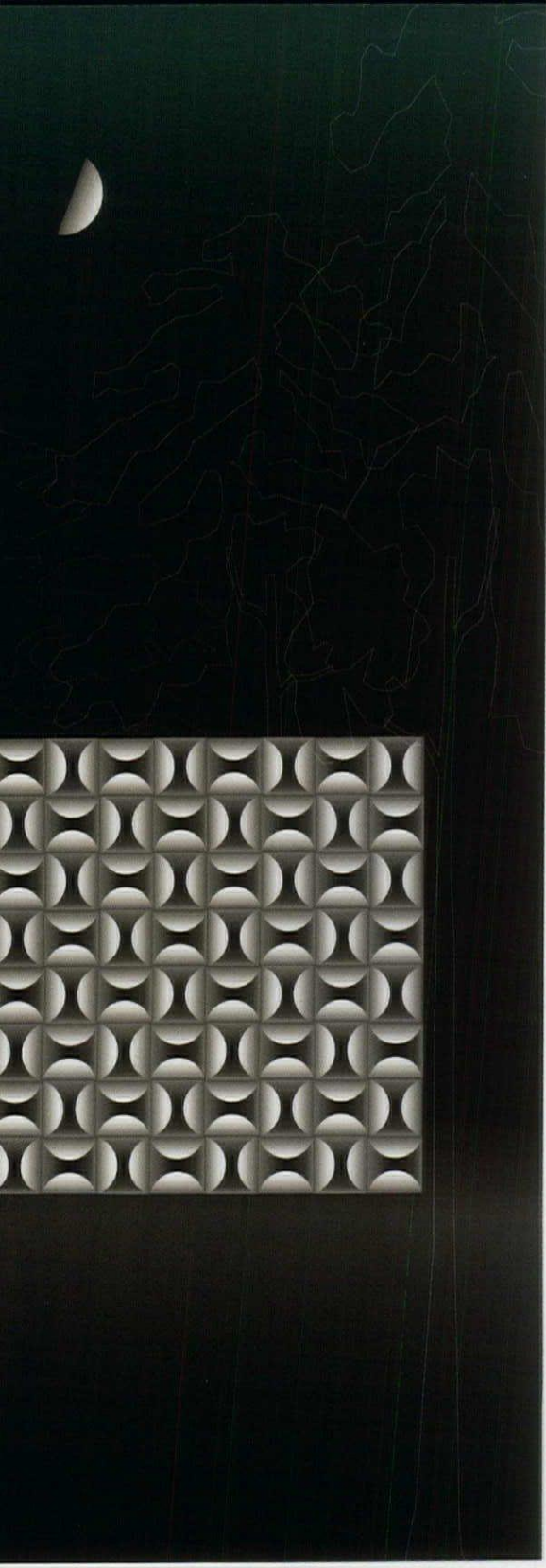
AGi32 also can perform lighting calculations, and Team NaCK used it to determine that light levels in the entry ranged from 10 to 20 footcandles.

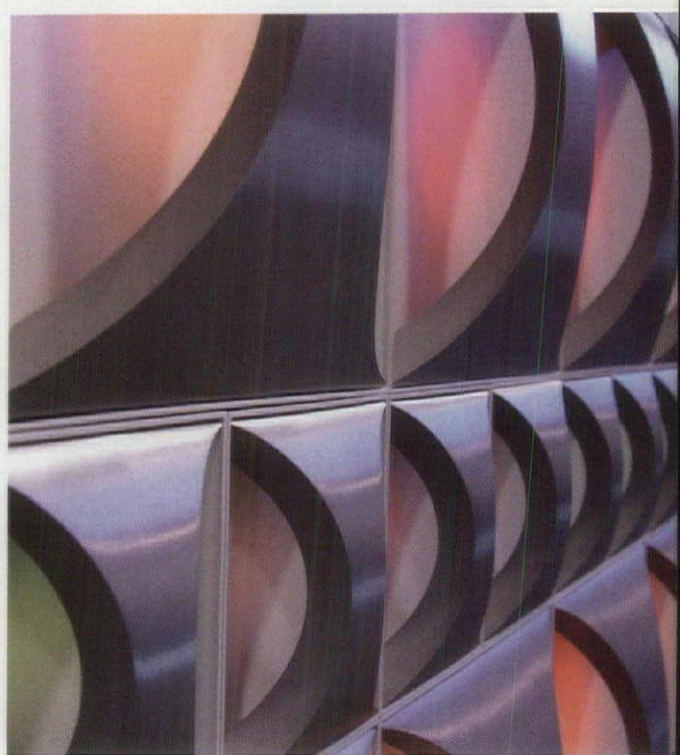




A STUDENT LUMINAIRE DESIGN TAKES SHAPE WITH SUPPORT FROM A LIGHTING MANUFACTURER

WAVE THEORY





Amanpreet Birgisson's concept for her luminaire design project was to create a fixture that could be configured in multiple patterns to create a visually dynamic surface for both interior and exterior spaces (above). The actual luminaire on display (right).

Studio/Course Interior Lighting Design
Semester Fall 2007
School Corcoran College of Art and Design, Washington, D.C.
Faculty Member/Adviser Andrea Hartranft
Student Amanpreet Birgisson
Manufacturer Visa Lighting
Rendering Amanpreet Birgisson
Photo Visa Lighting

For the past four years, graduate-level interior design students at the Corcoran College of Art and Design in Washington D.C., have been introduced to the basics of lighting design by Andrea Hartranft, senior associate at Alexandria, Va.–based C.M. Kling & Associates. "The goal is to teach them to think about lighting as an integral component to architecture, to provide them with a vocabulary and an understanding of the physics and technology associated with lighting design, and to increase their appreciation of the psychological and physiological effects of lighting on the occupants of a space," Hartranft says. That would be enough for most, but during the fall 2007 semester, one student—Amanpreet Birgisson—came away with a bonus: seeing her design put into production.

Each semester, students in Hartranft's class are presented with a luminaire design project that asks them to "design a pendant or sconce that is functional and buildable." Starting with a sketch she had produced for a color theory class, Birgisson conceived her project, "Modular Tile Luminaire System," as a wall-mounted fixture that can be rotated, arrayed, and interconnected in various combinations to create a visually dynamic surface. A two-dimensional geometric pattern is transformed into a three-dimensional grid that "provides overlapping convexes and concaves for soft shadows and reflections," Birgisson explains. An LED module concealed in a cavity between the surfaces creates a sophisticated play of light and shadow that multiplies as the modules are repeated.

Michael Arndt, industrial designer for Milwaukee-based Visa Lighting and jury member at the project review, was so impressed with Birgisson's design that he suggested that the company put it into production. "It was obvious from her presentation that Amanpreet had spent a lot of time researching and developing the concept into a viable product," says Jimalee Dakin, vice president of sales and marketing at Visa. "She had a complete package that included concept sketches, a detailed 3D computer model, and she had specified a practical LED light source." As a result, Visa was able to develop it into what is now the Wave product line, introduced in May at Lightfair.

The production fixture differs only slightly from Birgisson's original concept. While the form and proportion remain unchanged, the original 9-inch dimension was modified to a 11-inch tile and a smaller 5.5-inch version, which is useful as a steplight. Birgisson's white-glazed industrial porcelain material also was replaced with die-cast aluminium, a more practical option for both mass production and ease of application since it is not as heavy and prone to chipping.

The choice of the light source—LEDs—also made it a good prospect for production. "Using LEDs fit in well with my general design inclinations," Birgisson explains. "Its low heat generation was attractive; the small size of the diode was perfect to keep the [profile of the] tile protrusion slim; the longevity of the LED was essential; and the low energy consumption was a bonus." The Wave also takes advantage of LEDs' wide range of color possibilities by including static and variable color options in addition to white light for the integral LED module.

Recognizing the value of a manufacturer's input for her students' luminaire design project, Hartranft's decision to invite Visa Lighting to the project review proved quite beneficial to both the student and the lighting company. Birgisson's work was given the exposure it needed to be transformed into an actual luminaire, and Visa Lighting gained a promising new fixture to add to its lineup of existing product offerings. What did Birgisson learn from this experience? "To always act upon [your] ideas and work towards their articulation," she says. "And, more importantly, to always filter creativity through a tempering lens of utility." A valuable lesson indeed, both in and out of the classroom. **MEGAN CASEY**

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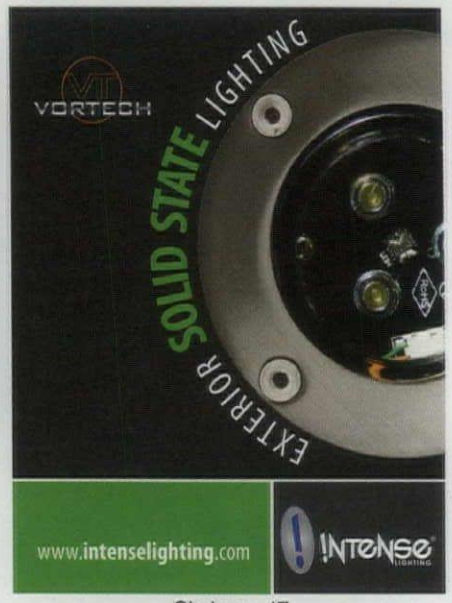

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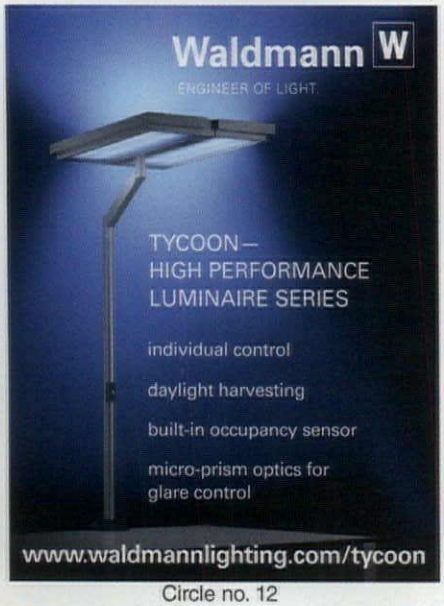

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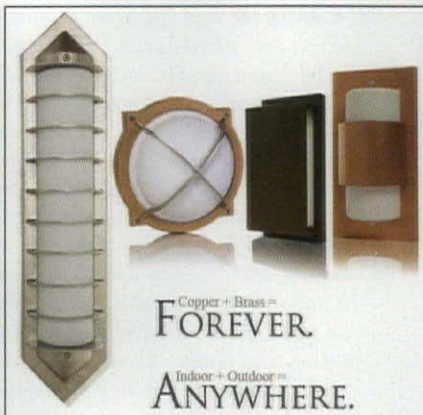

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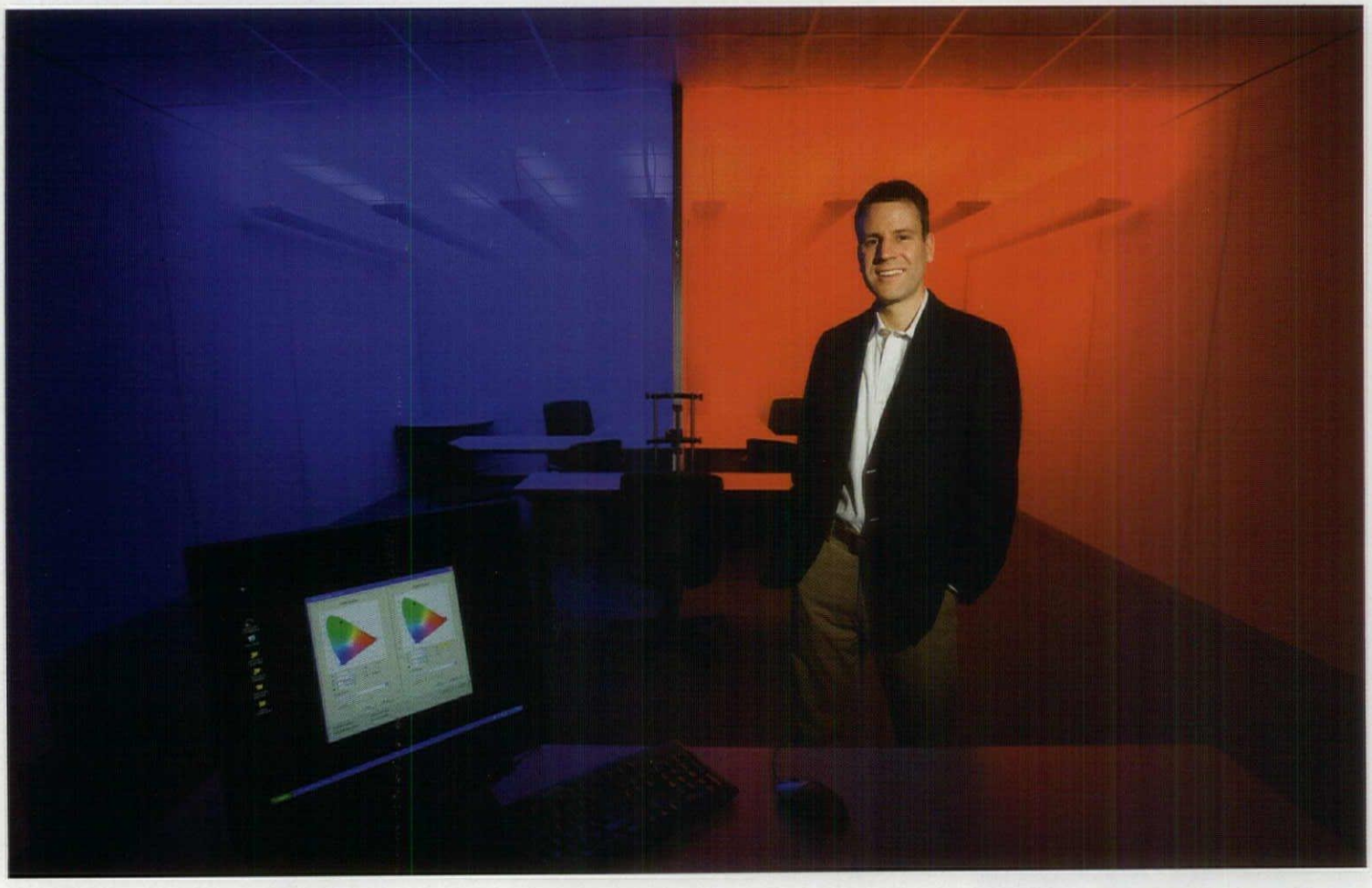

Kevin Houser

INVESTING IN STUDENTS AND HELPING TO GUIDE LIGHTING EDUCATION'S FUTURE

Kevin Houser has distinguished himself as an educator at both the University of Nebraska-Lincoln and Pennsylvania State University, which is his alma matter. Although he has taught lighting in architectural engineering programs for more than 10 years, he was drawn to the field not only for its technical side, but also for how lighting impacts human emotions and conveys information. Most recently, he has been busy with Project CANDLE (Create an Alliance to Nurture Design in Lighting Education), a program with IALD Grant to Enhance funding that focuses on strengthening industry/university partnerships to increase the number of lighting students and create an educational curriculum that is responsive to industry issues. A perpetual student, Houser thrives on a love of learning and sharing of ideas—an excellent combination for infusing the next generation of lighting designers with a passion for lighting. **ELIZABETH DONOFF**

How do you maintain lighting's presence at a large school?
Even though many universities are nonprofits, they operate like a business. Getting traction with the decision makers—university presidents, deans, and department heads—is really important.

Is there a "way" to teach lighting?
There are specifics to each institution that one has to be mindful of, but I am encouraged by the idea of a core curriculum. It's forward thinking in its attempt to harmonize the skills that a person should have to call themselves a lighting designer when they graduate.

Do you see a time when lighting will require licensure?
Long-term I think this will have to happen; the Texas House Bill issue brought that to the fore. If lighting is going to be taken seriously as a profession, licensure is going to need to be a part of that.

How can lighting education sustain itself?
There is a genuine desire among educators, lighting professionals and the manufacturing community to develop long-term collaborative relationships. That's been a tenet of Project CANDLE. It says a lot to students when they see professional and industry support.

What would you tell those students who now are entering the job market?
These are, unfortunately, unusually bad economic times, but I'd encourage students to take the long view. What happens in the next 12 to 24 months is not likely, we hope, to be characteristic of what happens over the next few decades. There are more interesting things happening in lighting than at any time since I've been involved in this field.

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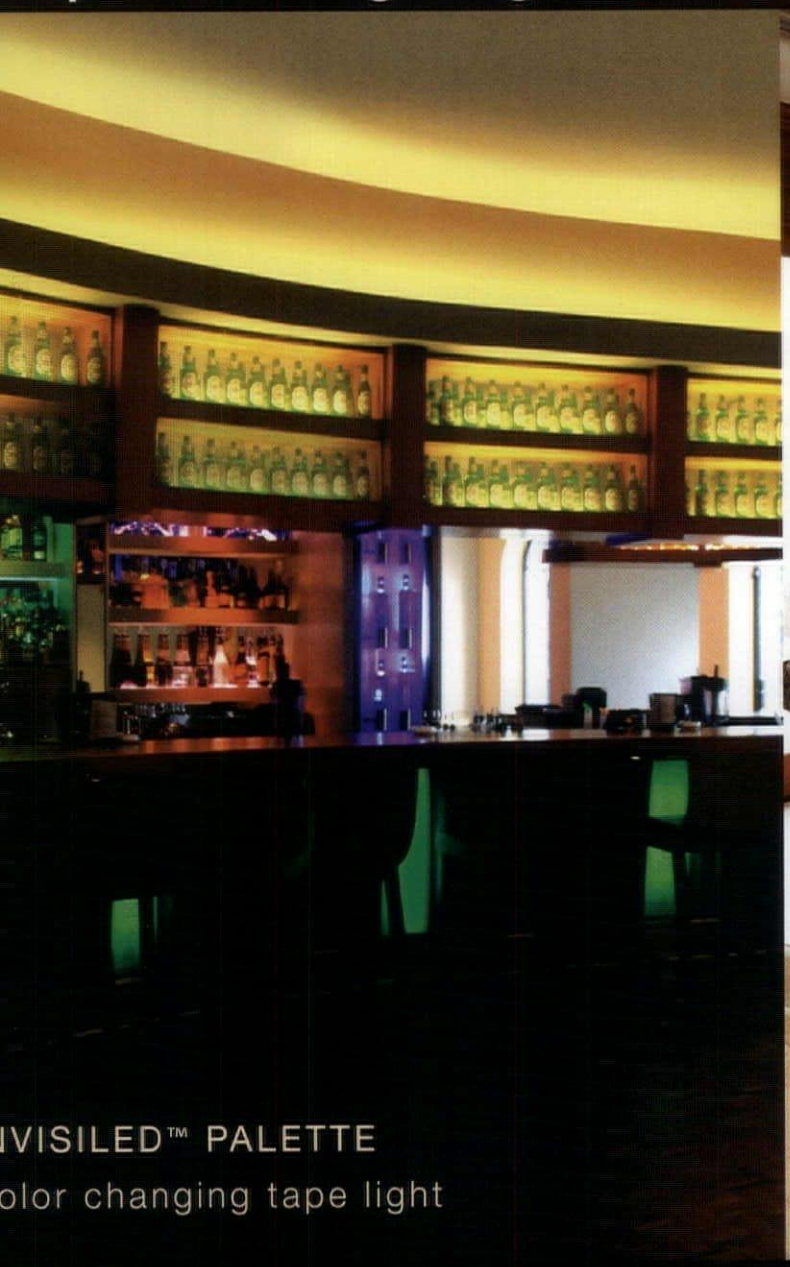

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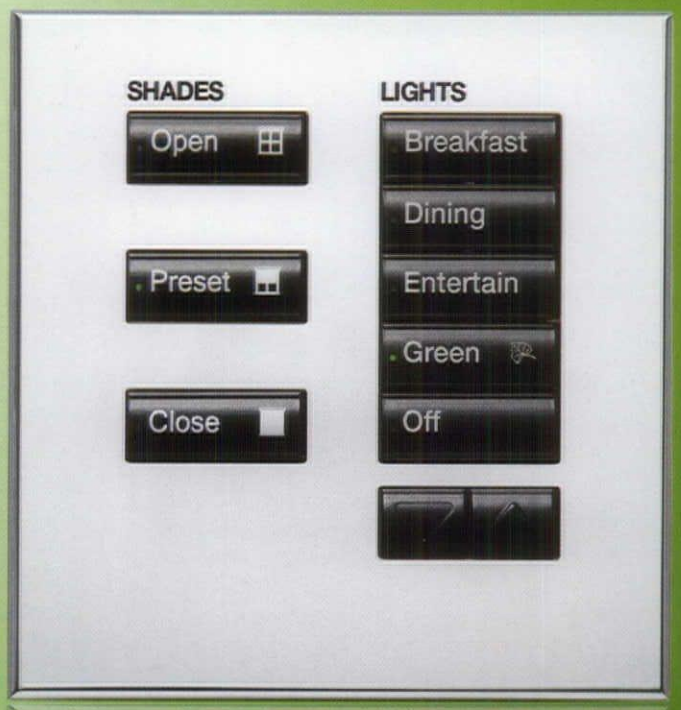

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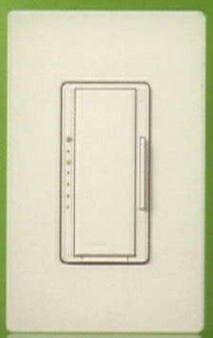

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