Field General

With boots on the ground at dozens of test sites, DELTA program director Jennifer Brons charts the many different breakthroughs in lighting technology

Once the ink is dry on the agreement and the partners are in place, someone must be there to steer a project through completion and document the results. For the Lighting Research Center's DELTA program, that someone is Jennifer Brons. And she leaves quite a paper trail (or these days, an electronic trail) behind.

While the LRC celebrates its 25th anniversary this year, the DELTA program, launched in 1993, has reached its 20-year milestone. For the last 10 of those years, Brons, a research scientist and adjunct professor of architecture at LRC, has been program director for DELTA (Demonstration and Evaluation of Lighting Technologies and Applications). DELTA essentially matches end users "willing to try experimental lighting products" with sponsors (e.g., utilities or manufacturers) "who want an independent evaluation of cutting-edge technology and/or want to field test new concepts," explains Brons.

Brons's role—to put it simply—is to manage the process and then get it all on the record. Nearly 40 lighting case studies ranging from offices, schools and stores to senior housing and industrial facilities have been evaluated in this program. The cast of characters has included an A&P supermarket, two Sony facilities, and a Lindt chocolate shop.

At the conclusion of each project, Brons (program director since 2003, covering 24 of these demonstrations) serves as lead author on a DELTA publication that assesses the installation. Lessons learned teach lighting specifiers about compatibility of lighting equipment, system performance and ways to improve their own lighting designs. The publications "also help the [product] commercialization process by pointing out opportunities for refinements," she adds.

In the Q+A that follows, Brons discusses how DELTA all comes together.

Walk us through the process of a typical DELTA project in terms of funding, the RFP process and bringing various players in the industry together.

Brons: The DELTA publications are typically funded by RFPs from public agencies or electric utilities who are interested in the *value* of lighting, that is, not only the costs (such as energy and maintenance), but also the other benefits (such as the quality of the lit environment and occupant acceptance). A great example is the New York State Energy Research and Development Authority (NYSERDA).

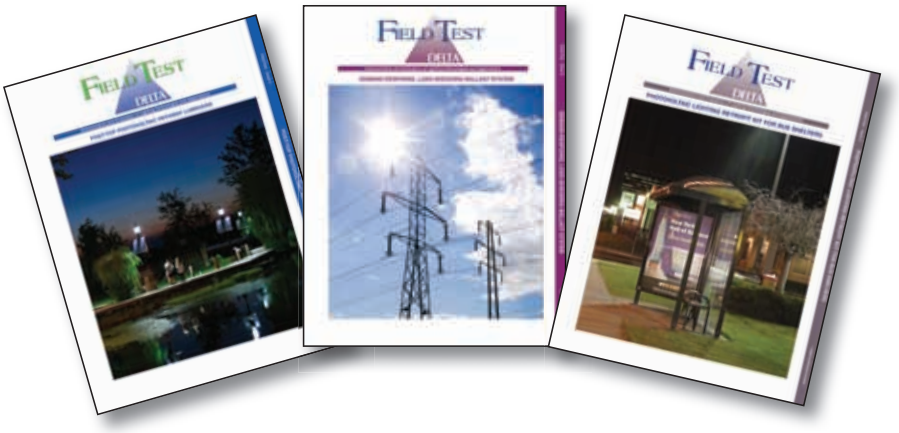
Sometimes we are approached by others who are interested in partnering to perform a case study funded by these agencies. Also, the proposal-writing process for other lab research at the LRC sometimes includes a DELTA case study as the culminating activity. Host sites are often determined during the proposal writing process.

What's your role in DELTA?

Brons: My primary role is completing the field study. Once the funding is awarded and the host site determined, I assemble the resources necessary to complete the field demonstrations. I personally collect data including questionnaires, interviews, photometric and geometric measurements, and energy monitoring. Colleagues at the LRC provide valuable feedback in developing this methodology, as well as analysis of the results. I shepherd the DELTA text through the process of reviews and layout until it is posted on the LRC website for all the world to read.

Is there a particular research area within the LRC (health and vision, automotive, daylighting, etc.) that's particularly "hot" right now within the DELTA program?

Brons: Because light affects so many of our experiences in our world, there is not one application focus to the DELTA program. DELTA has targeted real-world applications of many types of lighting technology from integrated skylight luminaires to photovoltaic lighting to LED freezer case lighting. We have produced DELTAs at grocery stores, retail shops, schools, senior residences, offices, art galleries, manufacturing plants and highway rest areas, to name a few.



Brons has served as lead author on two dozen case study reports.

At the moment I'm working on DELTA research concerning such diverse topics as daylight, parking lots and construction lighting. In fact, we plan to release two or three new DELTA reports this year. When I started working on DELTAs 15 years ago, fluorescent technologies were most commonly featured. These days, LEDs and controls offer many interesting features to be researched in the field.

Have any products recently come to market as a result of DELTA?

Brons: With funding from NYSERDA, my colleagues at the LRC recently worked with WAC Lighting to develop an LED track light; the resulting DELTA Snapshot publication demonstrated that the LEDs were well-liked in a community gallery and saved considerable energy relative to conventional technology. Several products based on that prototype are now on the market. Another example is our field demonstration of a load-shedding ballast system; with funding from NYSERDA, this DELTA publication showed the opportunities for reducing electrical demand at several sites. After our research collaboration, OSRAM Sylvania now has a load-shedding system on the market.

Besides DELTA, what other projects have you been working on recently?

Brons: With support from NYSERDA, I was part of a team that developed the new LRC website *"Lighting Patterns for Homes."* LRC also recently demonstrated a "modular infrastructure" project in the field (see sidebar). I was pleased to perform the data collection for that field demonstration in southern California.

—Paul Tarricone

Office Mod Squad

In a Hollywood conference room, researchers from the Lighting Research Center (LRC) at Rensselaer Polytechnic Institute and product engineers from OSRAM Sylvania capped off eight years of research and concept development with a field demonstration that speaks to LED's potential as a flexible lighting solution in office environments.

The installation at the offices of Paramount Pictures features modular LED-lighted tiles on the ceiling and walls that can be moved to any location on a low-voltage, DC-powered grid with wireless controls. The demonstration was funded by the California Energy Commission.

The modular approach combined two concepts: One was to create an adaptable lighting solution that would allow users to change lighting by allowing them to move luminaires as easily as it is to move furniture and artwork. The other was to create a novel concept where LED lighting's benefits would be realized—specifically, energy savings and "tunability" to meet users' individual lighting needs and preferences—and its drawbacks mitigated, including design issues (e.g., trapped heat) and the problem of quickly obsolete products.

The conference room demonstration with different lighting effects produced by the DC-powered infrastructure system for LED lighting.

The original conference room with fluorescent general and incandescent accent lighting.

The field demonstration project team set out to find commercially available building materials that could be customized to create the low voltage, DC-powered infrastructure and LED lighted tiles. For the walls, a commercial shelf lighting product with an integral power feed was customized to accept 2 ft by 2 ft metal tiles with power-conducting mounting hooks to energize the luminaires. The tiles with built-in LED luminaires had wireless controls. For the ceiling, a dropped ceiling product with an electrified grid accommodated the same 2 ft by 2 ft metal tiles. In addition to the LED-lighted tiles, non-lighted acoustic tiles helped fill in the edges around the room's periphery. At the field demonstration site, acoustic tiles were cut onsite to accommodate sprinkler heads. To manage the system's heat and ensure maximum life and lumen maintenance, LEDs were mounted to metal plates and housings to extract heat.

One objective of the new lighting design was to meet the task needs of conference room users (e.g., lighting for meetings, audio/visual presentations, etc.), which was determined to be possible with the new modular system, although the distribution of light would be different than before. During the installation, the new dropped ceiling was installed, providing the DC power distribution, and wall mounting grids and brackets were hung for the wall-mounted tiles. Self-luminous frames to backlight movie posters were also introduced into the mix.

For the demonstration, six types of lighted tiles were designed to provide nine layers of lighting, including downlighting, diffuse "cloud" lighting, wall-wash task lighting, wall sconce uplighting, and colored halo lighting in red, green, and blue. Occupancy sensors and dimmers were incorporated into the system, and dimmer switches were programmed to operate groups of lights cohesively. Each lighting layer was controlled separately and remained controlled by the same dimmer switch when moved to another location on the grid.

Users of the conference room greatly approved of the new lighting, with 83 percent stating they thought it was better than the lighting available in other conference rooms. In surveys taken before the installation, only 34 percent had that impression about the existing lighting.

Photometric measurements taken before and after showed that with the new system, more light (on an average 45 percent) was directed toward the horizontal plane of the table and less light (on an average 25 percent) toward the walls, all while using approximately 61 percent less power than the previous system.