FLEXLAB™ HELPS PHILIPS LIGHT OFFICES RIGHT

TEST FURTHERS INTEGRATED LIGHTING & SHADING CONTROLS THAT BOOST COMFORT, SAVE ENERGY

THE CHALLENGE: How to let in significant daylight into offices, while minimizing glare from the windows.

Allowing ample daylight into offices can be a good thing, as most people prefer daylight to electric light. Lighting control systems that save energy by dimming electric lighting with increased daylight levels have been available for years. But automated shading systems, which are well suited to controlling the uncomfortable glare that can come through windows, are a recent development. By integrating shading system and lighting control system operation, we can create comfortable well-daylit offices while minimizing glare from windows.

To achieve this, Philips needed to develop and test the glare sensing technology as well as the software formulas – algorithms – to control the lighting and shading systems. Philips enlisted Berkeley Lab's expertise in daylighting and lighting controls for this effort. The FLEXLAB facility offered an indispensible infrastructure for both developing the glare sensor, as well as testing different control algorithms for the shading system and the electric lighting.

THE SOLUTION: FLEXLAB

Philips Research North America collaborated with Berkeley Lab to develop accurate glare-sensing technology. Then they incorporated it into an integrated lighting and Venetian blind control algorithm to maintain good task lighting while preventing daylight glare. Philips used FLEXLAB to evaluate the control algorithm's performance in an occupied testing environment with a southwest-facing façade – one of the most challenging conditions for glare control.

> *We are proud to be the first user of FLEXLAB's Occupied Lighting and Plug Loads Testbed. It was a great use of the facility. It was very helpful to be able to connect our customized hardware and software to the FLEXLAB data acquisition and control infrastructure and collect all the data from a single point."* .

YAO-JUNG WEN | PHILIPS RESEARCH NORTH AMERICA
Senior Member, Research Staff, Lighting Solutions and Services

THE BOTTOM LINE:

FLEXLAB testing showed that lighting and shading systems can work well together to save energy while providing a comfortable and productive environment for occupants.

- FLEXLAB proved to be an excellent laboratory for testing integrated shading and lighting systems: A real office with real people working in it, equipped with state-of-the-art power monitoring and data acquisition infrastructure.

- FLEXLAB was particularly helpful for tweaking the operation of the shades so that comfortable conditions were provided for the occupants while minimizing distracting adjustments.

> *"FLEXLAB really proved its worth in this experiment. It allowed researchers to compare real measurements of photometric data from the FLEXLAB experiment with simulations of those same data generated by the Radiance lighting simulation tool."*
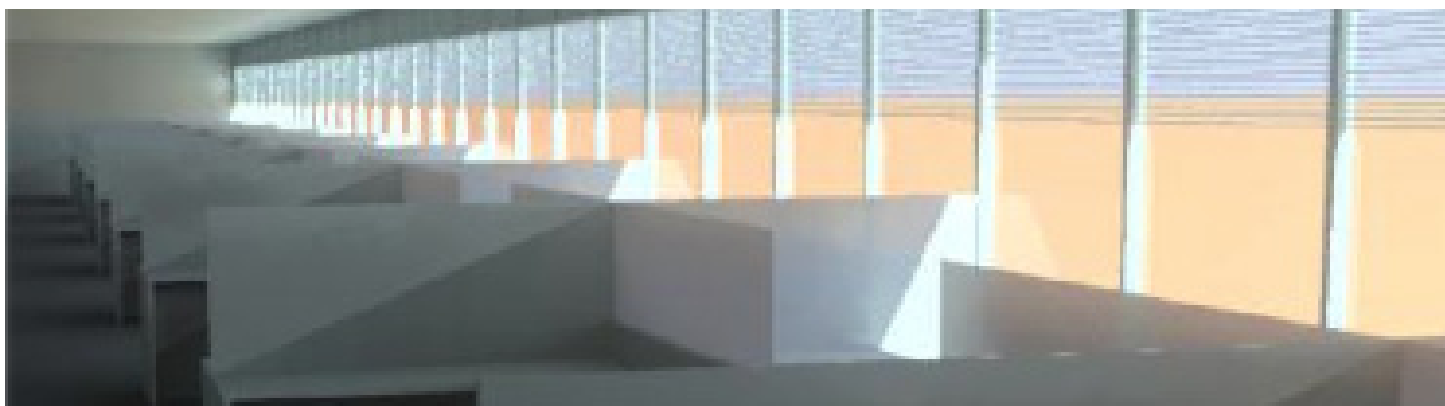
FRANCIS RUBINSTEIN | BERKELEY LAB
Staff Scientist

THE EXPERIMENT

- An integrated lighting and shading system was installed in a private office in FLEXLAB's Occupied Lighting and Plug Loads Testbed.

- The amount of daylight entering the room was measured by a specially designed glare sensor at the rear of the room. The shading system could be raised or lowered and the slat angles changed to keep the glare below a threshold value.

- The electric light and daylight levels at the workplane were detected by a ceiling-mounted light sensor.

- The experiment consisted of adjusting the control algorithms so that the light level at the desktop did not fall below the design level while the glare-sensor controlled shading system kept the glare from the window below discomfort levels (about 4000 **lux** as measured by the glare sensor).

THE RESULTS

- The FLEXLAB experiment showed that lighting and shading systems can work well together, maximizing the use of natural daylight while minimizing glare. This saves lighting energy, while creating a more pleasant and productive work environment.

- Lighting in the test room followed the natural, dynamic rhythm of daylight, without creating any glare or under-lit conditions. Through sunny periods and cloudy ones, the system maintained appropriate and comfortable lighting levels.

- FLEXLAB was useful in testing different commissioning strategies as well as identifying ways to minimize glare while avoiding distracting adjustments of the shades.

BERKELEY LAB