



High Performance Building Façade Solutions

PIER Buildings Program

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The Problem

Glazing and façade systems directly influence peak heating and cooling loads, and indirectly influence lighting loads when daylighting is considered. The systems are a major determinant of annual energy use and have significant impacts on cooling system sizing, electric load shape, and peak electric demand. As prominent architectural and design elements, glazing and façade systems influence occupant preference, satisfaction and comfort, so the design optimization challenge is more complex than with other building systems.

The Solution

The design challenge for architects and engineers is to quickly identify and evaluate the cost-benefit tradeoffs of solutions that address factors such as cooling, daylight, glare, view, cost, and maintenance. The project goals are to: 1) develop tools that will enable designers to design high-performance façade solutions, and 2) identify technological approaches that facilitate performance optimization.

Features & Benefits

A “technology portfolio” report, geared towards architects and building owners, will include descriptions of the metrics, performance requirements, façade technology options, and discussion of architectural and business issues, performance results from simulations and testing, and summaries of market demonstration activities.

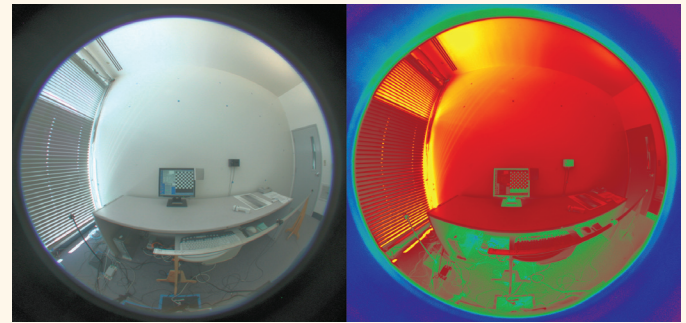
Software tools will include the following expansion of features and capabilities:

- Expansion of the LBNL WINDOW database to incorporate a wide range of optically-complex products
- Enable the direct linkage between WINDOW, Radiance, and EnergyPlus so that optically-complex, operable façade systems can be better addressed
- Release of a commercial fenestration (COMFEN) simulation tool that enables architects to quantify performance trade-offs while conducting what-if scenarios at early design stages

Applications

New and retrofit commercial buildings with vertical windows.

Photograph (left) and falsecolor luminance map (right) of a daylight-redirecting Venetian blind in the LBNL Windows Testbed Facility.



What's Next

Field studies of innovative internal and external daylighting-shading systems will be conducted from solstice to solstice (concluding December 2008), resulting in monitored energy and non-energy performance. Results will be reported in the Technology Portfolio report.

A beta version of the COMFEN tool has been released with the EnergyPlus building energy simulation program as its core engine and will continue to be refined to incorporate innovative façade systems.

Collaborators

The U.S. Department of Energy is a co-sponsor of the High Performance Building Façade Solutions Program.

Collaborators include: Energy Efficiency and Renewable Energy, Building Technologies Program.

In-kind contributors include: Advanced Glazings Ltd., Colt International Ltd, Hunter Douglas, Köster Lichplanung, Lutron Electronics, Inc., MechoShade Systems, Inc., NYSAN Solar Control, Somfy Systems, Viracon, Warema, and Wausau Window and Wall Systems.

For More Information

<http://gaia.lbl.gov/hpbf/>