

Software Tools for Windows



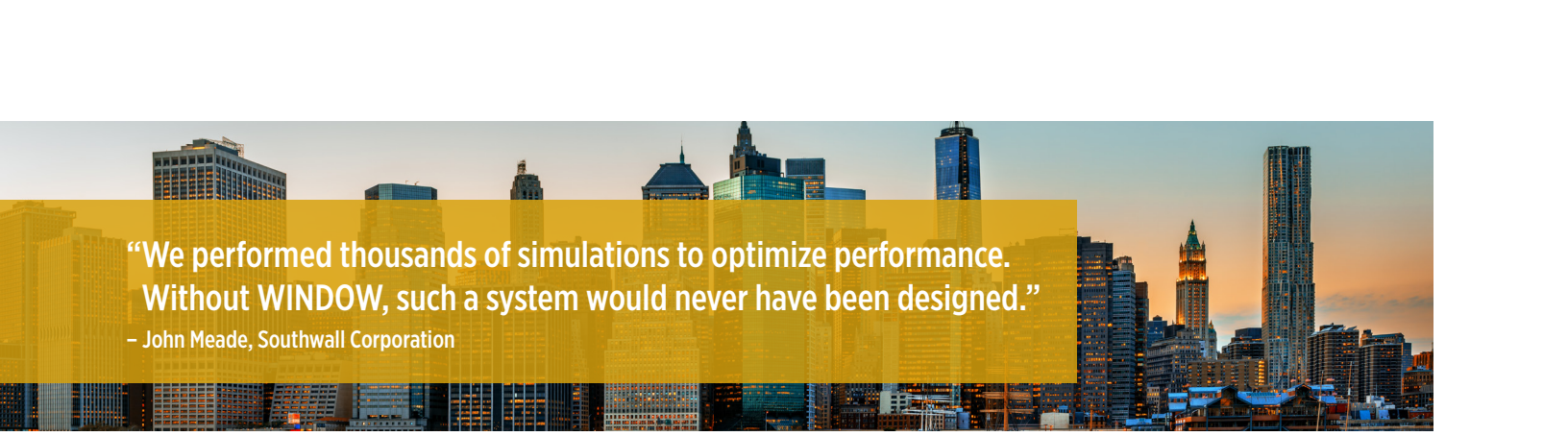
Essential Guidance
for Industry



Every Window in the U.S. Market is Touched by Berkeley Lab Software

For more than 30 years, the window software tools supported by the Department of Energy and developed by Lawrence Berkeley National Laboratory have been critical to the development and application of new energy-efficient windows. In 1984, Berkeley Lab introduced WINDOW, a software program that calculates window thermal performance. Ten years later, Berkeley Lab launched THERM to model the impact of different window frames. Now widely acknowledged as industry standards, WINDOW and THERM, along with Berkeley Lab’s International Glazing Database (IGDB), help architects and engineers design and specify windows, and public officials develop new energy codes.

BERKELEY LAB SOFTWARE	WINDOW & THERM	IGDB DATABASE
<p>30 YEARS OF DEVELOPMENT</p>	<p>IMPACT 100% OF NEW WINDOWS</p>	<p>6,000 GLAZINGS</p>
<p>NINE SOFTWARE PACKAGES</p>	<p>500,000 DOWNLOADS IN 15 YEARS</p>	<p>100 COMPANIES FROM</p>
<p>1 LEADING INDUSTRY STANDARD</p>	<p>USERS IN 44 COUNTRIES</p>	<p>20 COUNTRIES</p>
		<p>SIX UPDATES PER YEAR</p>



“We performed thousands of simulations to optimize performance.
Without WINDOW, such a system would never have been designed.”

– John Meade, Southwall Corporation

Building More Energy-Efficient and Comfortable Windows

Calculating window performance is a complex undertaking. Window designers use WINDOW and THERM to determine how much heat and light will pass through a window. The same window will perform differently depending on whether it's in Minneapolis or in Houston, whether it's summer or winter, and even whether it's on the north or south side of a building. Modeling enables designers to estimate how a window will perform under different conditions and to select the window that optimizes energy performance and occupant comfort. Taken together, WINDOW and THERM provide a single implementation of calculation procedures which enables manufacturers, engineers and public officials to make like-for-like comparisons. And because they have always been available free of charge, they've created a level playing field for smaller manufacturers and architecture firms that would not be able to develop advanced modeling tools on their own. Today's high-performance windows would not exist as we know them without these indispensable tools.

Aiding Window Selection

Consumers also rely on WINDOW and THERM, though they might not know it. The National Fenestration Rating Council (NFRC) uses WINDOW and THERM, as well as input from Berkeley Lab's International Glazing Database (IGDB), to certify window performance. The IGDB database is updated six times a year and is the most complete database of glazing properties in the world. Residential windows in the U.S. are sold with NFRC labels that help consumers compare performance.

“By integrating thermal modeling in WINDOW/THERM with design development, we were able to design our products to meet or exceed Energy Star criteria throughout the US.”

– Steve Johnson, Andersen Windows

BERKELEY LAB SOFTWARE TOOLS

WINDOW Calculates window performance indices (U-value, solar heat gain and shading coefficient, and visible transmittance). Can also model complex glazing systems, such as those with Venetian blinds or roller shades.

THERM Models two-dimensional heat-transfer in window frames and in building components such as windows, walls, foundations, roofs, and doors. Also, appliances and other products where thermal bridges are of concern can be modeled.

IGDB Provides all the data needed to calculate the thermal and solar-optical properties of a glazing system. Manufacturers pay a fee to keep data current.

RADIANCE Open source lighting and daylighting simulation tool. Many tools with a graphical user interface, such as DIVA, rely on Radiance on the backend.

RESFEN Helps consumers and builders pick the most energy-efficient and cost-effective window for residential applications.

COMFEN Evaluates alternative façade systems, such as windows and overhangs, for project-specific commercial building applications.

OPTICS Calculates the solar-optical properties of multiple glazing layers. OPTICS capabilities are being incorporated into WINDOW.

CGDB Repository for non-specular fenestration products, such as shade screens, Venetian blinds, and cellular shades.

AERCALC Calculates the annual energy performance of window attachments.

windows.lbl.gov/software