



PHOTO COURTESY KALWALL CORPORATION

FACILITIES & MAINTENANCE

Measure the Value of Daylighting with Daylight Modeling

by Mike Crowder

The architectural community has come a long way in embracing this fact, most recently exhibited when an architect on the University of California Santa Barbara's (UCSB's) design committee resigned from his position over a proposal blatantly lacking appropriate natural lighting, citing inhumane conditions for the students who would be forced to reside in the proposed building.

The choice to daylight a building is one that should be made at the beginning of the design process, leaving only the question of how to go about it. Architects can use numerous strategies for lighting a space, including artificial lighting and daylighting. But there is one way to ensure a design is meeting appropriate light levels and not falling into the trap that UCSB did: daylight modeling.

Daylighting for Education

Daylight is essential and provides benefits for students whether they are studying, playing sports, or just hanging out. Students spend a lot of their time indoors, so the introduction of natural daylight to interior spaces helps maintain circadian rhythms for overall physical and mental well-being. This access to sunlight equates to improved mood and performance, creating an environment for success.

The impact of daylight on students is proven. A highly respected study by the Heschong Mahone Group showed students in classrooms with the most daylighting progressed 20% faster on math tests and 26% faster on reading tests over a year period than those with the least daylighting. But

daylighting that is poorly implemented can have adverse effects. Uncontrolled sunlight entering a space can create issues with glare, leading to shades or other control features being implemented, ultimately negating the benefits of daylighting in the first place. Daylight modeling allows designers to plan and avoid these issues to ensure the best daylighting strategy.

Daylight Modeling

Daylighting is the practice of introducing controlled natural light into an interior space. Daylight modeling measures the performance of daylighting strategies using 3D software to simulate the building, capturing every pattern of daylight throughout the structure. The goal is to ensure that a design meets appropriate

levels of natural light while reducing glare. Daylight modeling allows a facility to be designed from the earliest stages to optimize construction for building occupants.

Daylight modeling uses several metrics to ensure that a design meets optimal light levels. Useful daylight illuminance (UDI) categorizes and measures the overall level of usable lux in a space, highlighting the areas of a room that do not get sufficient levels of natural lighting. Spatial daylight autonomy (SDA) measures the percentage of a space that meets recommended illuminance levels over a defined period of time. Annual sunlight exposure (ASE) helps limit excessive sunlight that could cause glare issues and is used with SDA to calculate LEED credits. Calculations are also made to identify glare potential and biological effects on potential inhabitants of a building.

Daylighting Standards

A landmark ruling in building lighting standards was the New York State Tenement House Act of 1901, which banned the construction of windowless



PHOTO COURTESY KAL WALL CORPORATION



KENYON
CERAMIC GLASS
COOKTOPS
Since 1931

SMART BUILT-IN SAFETY FOR THE USER AND FACILITY



CHILD SAFETY LOCK-OUT WITH AUTO SHUT-OFF



HEAT LIMITING COOKING SURFACE PROTECTORS



MEETS ADA REQUIREMENTS INCLUDING CA & TX



RADIANT & INDUCTION COOKTOPS AVAILABLE

CONTACT US FOR SPECIAL PRICING:
COOKWITHKENYON.COM | 860.664.4906



PHOTO COURTESY KALWALK CORPORATION

Daylighting is the practice of introducing controlled natural light into an interior space. Daylight modeling measures the performance of daylighting strategies using 3D software to simulate the building, capturing every pattern of daylight throughout the structure.

and unventilated buildings throughout the state. Under this legislation, all buildings are required to have outward facing windows in each room, proper ventilation to circulate fresh air, indoor plumbing and open outdoor courtyards.

While there are no legal code requirements for daylighting in the United States, many standards regarding lighting design have evolved since the turn of the 20th century. The Illuminating Engineering Society (IES) was established in 1906 and remains one of the most prominent authorities on illuminance standards. IES standards help architects and engineers understand lighting recommendations and design well-lit, high-performing buildings

that reduce reliance on artificial light.

The most basic use of daylight modeling is to ensure that spaces are meeting recommended light levels, measured in units of illuminance or lux. According to current standards, 300–3000 lux is considered a desirable lighting level in most cases. Meeting certain lux levels measured by SDA and ASE can help a building earn LEED® or other sustainable building credits.

Daylight Modeling and the UCSB Dormitory Design

UCSB is currently pursuing a dormitory that would have 4,500 students living across eleven stories in windowless bedrooms,



PHOTO COURTESY KALWALL CORPORATION

relying entirely on artificial environment systems to filter air and provide artificial light and synthetic views of the outdoors. Because the systems rely entirely on environmental simulations, in the event of a power outage or disruption, the building is deemed nearly entirely uninhabitable due to the lack of air filtration or natural lighting.

Aside from the proven health and wellness benefits of introducing natural daylight to this space, utilizing daylight modeling could minimize the need for artificial lighting and create impressive energy savings. Proper daylighting can also improve a building's thermal performance, reducing heating and cooling loads.

Daylight modeling for UCSB or any construction project could help to identify the best design strategy for introducing natural light, with the ability to compare materials, placements and building geometries.



ABOUT THE AUTHOR: Mike Crowder, LEED AP of Kalwall Corporation, has more than twenty-five years of experience in the building materials industry. He travels across the U.S. and Canada educating architects, engineers, and contractors on the benefits of natural daylighting. Learn more about Kalwall's complimentary daylight modeling services at www.kalwall.com/daylight-modeling-services/.

Aside from the proven health and wellness benefits of introducing natural daylight to spaces, utilizing daylight modeling could minimize the need for artificial lighting and create impressive energy savings. Proper daylighting can also improve a building's thermal performance, reducing heating and cooling loads.