

Kalwall and Daylight Modelling



Kalwall® and Daylight Modelling

Kalwall offers architects and specifiers various free daylight modelling services and calculations to aid specification. This service is provided free of charge if Kalwall is being considered for a project.

Daylight Modelling can help architects and specifiers with the following calculations:

1. The quantity of light transmitting materials
2. The location of light transmitting materials
3. The required transmission level of the light transmitting materials
4. For Glare Pattern analysis

Daylight Modelling can help achieve an exact brief from the client - for example the lux level requirement or to address concerns about solar heat gain. It can help quantify daylight transmitting products, determine optimal light transmission and help with positioning on a building to prevent glare issues and provide interior lux levels.

The reports can be looked at from a cost point of view and recommendations made depending on the results. A good example of this is for Value Engineering (VE) where daylight modelling can, for example, show that windows can be reduced in size to save money yet still achieve the desired lux levels.

Daylight Modelling as part of the design:

It is beneficial that this service is used early in the design phase to help achieve the best possible results for the client and to form part of the overall building strategy and goals. For example, the service can help with the documentation required to achieve BREEAM's health and well-being credit for visual comfort (HEA01).

Daylight Modelling is the way to calculate the most effective daylighting for any type of building. Simulations can use five years' worth of real world weather files at the exact location as well as information on day, time, position and weather patterns.

The report can include any or all of the following calculations:

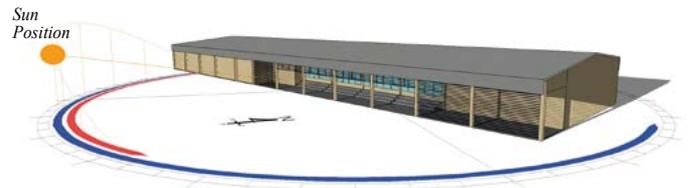
Lux Level:

Lux is equal to one lumen per square metre. In photometry, this is used as a measure of the intensity, as perceived by the human eye, of light that hits or passes through a surface. For example, sports halls and classrooms would be expected to have lux levels of between 300-400.

Radiance Illuminance:

Radiance Illuminance (measurement of light level) is a snapshot of the ambient lux level (light) at any given time. This tool calculates how effective is daylight penetration at any time of the day or on any day in the year.

Daylight autonomy:

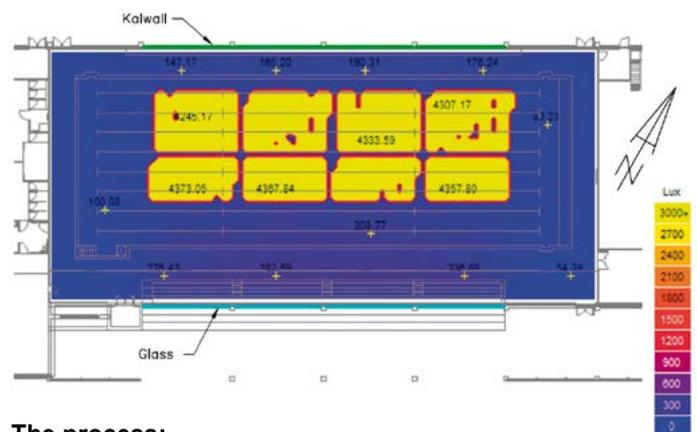


Daylight autonomy (DA) is the percentage of the time-in-use that a certain user-defined lux threshold is reached only through the use of daylight. DA is usually given as an annual value but seasonal, monthly and daily presentations can be made. It is the ideal way to achieve optimum natural daylighting conditions for the occupants, predicting when electric lighting may be required and thereby helping to reduce the cost of energy.

Glare Pattern analysis:

This tool calculates luminance (measurement of glare) within a space. It is used to analyse direct glare or reflected light which is important to know in many situations, such as in sports halls and swimming pools where it is preferable to have balanced light within a space to protect athletes from high contrast light ratios.

For example, the graphic below shows direct glare coming through the windows into a sports hall - excessive lux levels from unfiltered daylight.



The process:

The daylight modelling team will undertake this service using data provided by the architect or client. This comprises an indication of light levels required together with building elevations, floor plans and sections.

It also takes into account proposed internal finishes, which could influence reflectance, the positions of other windows and any external influences, such as tall adjacent buildings or trees.

With this information, the team can look at an individual room or at the overall situation and design the most favourable daylighting solutions.

Daylight Modelling in Practice

HARPER ADAMS ACADEMY

Kalwall has been specified for the new Weston building at Harper Adams University designed by Michael Hyde architects.

One of the project's stunning features is the way in which Kalwall has been used to allow and control the interior daylight, remove glare and shadows yet maintain light levels and minimal solar heat gain. This was achieved using daylight modelling to predict the illumination levels across the floors. The result is that the privacy of the students is preserved while they benefit from very attractive leisure and social areas on two levels.

This roof solution utilises a 0.56 W/m²K U-value panel solution, with only 6% light transmittance. The daylight modelling documented that even with these low transmission figures, lux level requirements were achieved. The main advantage for the client was to bring the G-value figure down to 7% thereby reducing the solar heat gain to a tenth of that of a standard low E double glazed unit.

Widely used for cladding and rooflights, the highly insulating Kalwall system is unique in the way in which it transmits Museum-Quality Daylighting™. The translucent panels have been designed to follow the curve of the laminated timber structure. This project demonstrates how the panels, manufactured to order and normally supplied flat, can also be curved by using with the proprietary Kalcurve® variation).



REDGRAVE SPORTS CENTRE

The Redgrave Sports Centre in Great Marlow is a new sports complex comprising multi-use hall, fitness suite and dance studio.

Due to its location, designers PTAL Architects were concerned about the potential issues with lux levels so they commissioned a free daylight modelling report.

The daylight modelling team ran the tests and observed issues with the 20% light transmission specified - especially around the autumn equinox with the low sun position on the South East corner. Normally the canopy roof would reduce the direct sunlight but throughout the autumn months the sun would be lower thereby causing undesirable lux levels.

The daylight modelling report further directed the design team to towards a lower light transmission at 9%. As a result, it was decided to install Kalwall clerestory daylighting around the three sides of the hall as recommended by the study.

An added advantage is that the Kalwall system bathes the interior with natural diffused daylight to create an attractive ambience without shadows or glare.



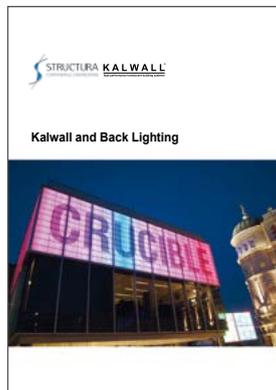
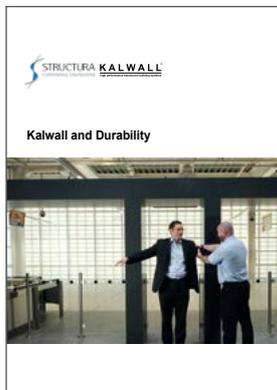
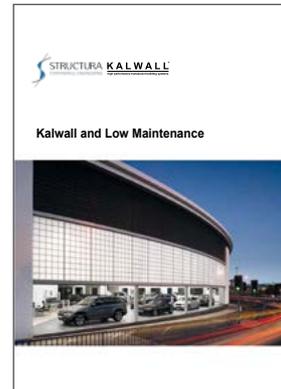
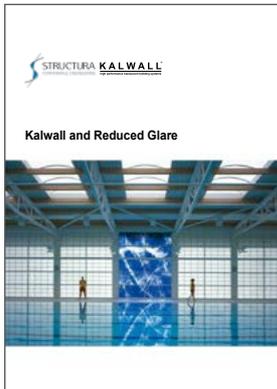
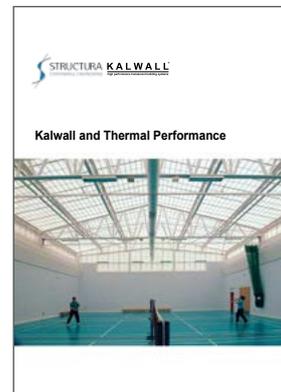
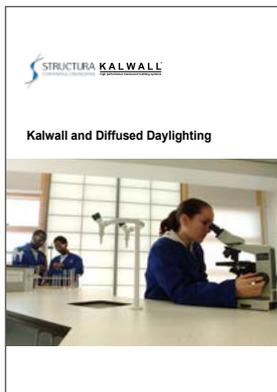
(Photos: ©Jumping Pixel)

What is Kalwall?

Kalwall, developed and manufactured in the USA for over 60 years, is a highly insulating, diffuse light transmitting building panel system for walls and roofs (from small units up to 30 metre monumental daylighting). The primary component is a translucent structural composite sandwich panel formed by permanently bonding specially formulated fibreglass sheets to a grid core constructed of interlocking thermally broken extruded aluminium 'I-beams'.

Panels are factory prefabricated to the exact size and configuration for each project. Panels can be flat or curved while opening or fixed glazed window units can be

incorporated using the integral Clamp-tite installation system. Kalwall's unique composition combines to reduce solar gain while at the same time maximising thermal insulation. Kalwall diffuses light so efficiently that even direct sunlight is converted into even illumination with reduced glare. Kalwall is able to transmit large amounts of usable daylight into a space with relatively low levels of light transmission. Panels can be selected to transmit various percentages of light according to individual project requirements. Kalwall has been tested according to the procedures of EN13830:2003 – Curtain Walling Product Standard for CE Marking.



Tel: 01233 501 504
www.structura-uk.com/kalwall
kalwall@structura.co.uk

Structura UK is the leading supplier, fabricator and installer of glass curtain walling, rainscreens, glass atria, windows and other architectural glass building products. The company is also the exclusive distributor for Kalwall translucent daylight building systems in England, Wales and Northern Ireland.