

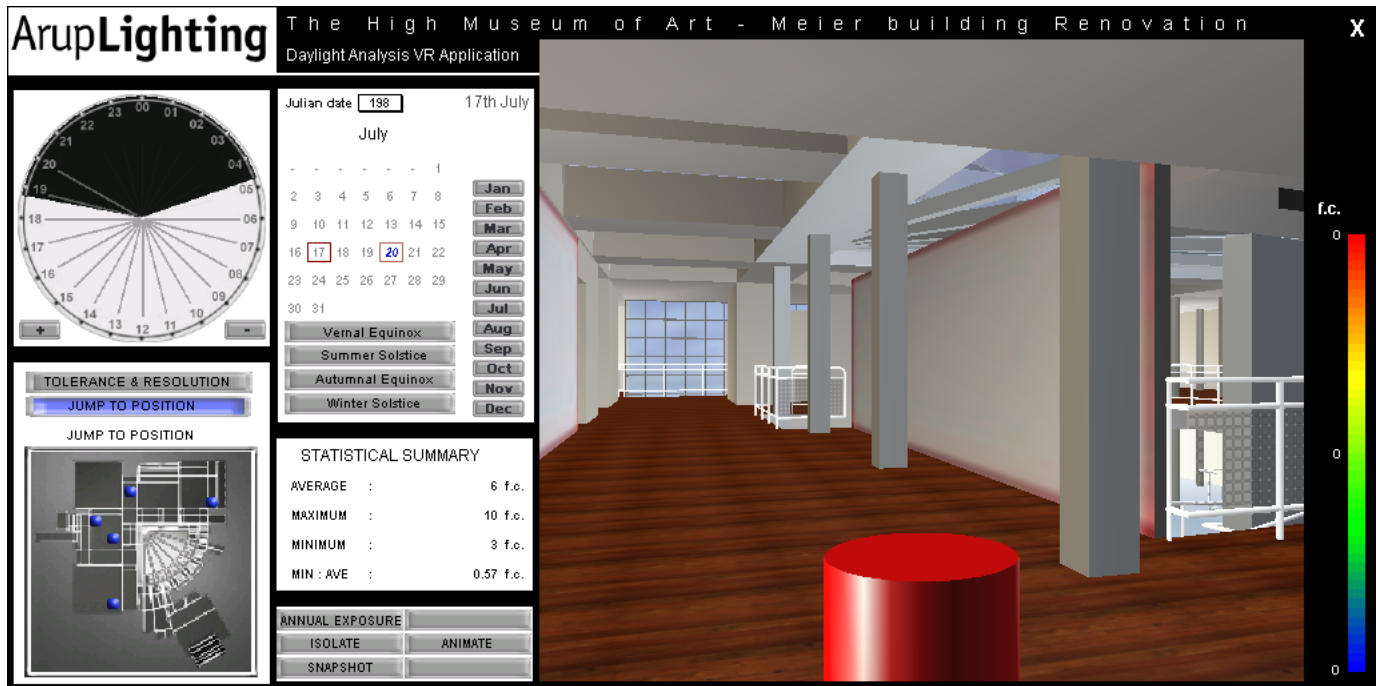
## VR Daylight Analysis

On a typical project, [Arup Lighting](#) run various analysis programs to predict the daylight penetration and distribution within buildings.

The daylight distribution on a number of surfaces is often of interest, with the data required for a large number of individual times of the year.

This generates large volumes of analysis data, which can be difficult to communicate to clients. Also, when there are multiple datasets for each analysis surface and there are a large number of analysis surfaces, it is easy to understand how confusion can arise.

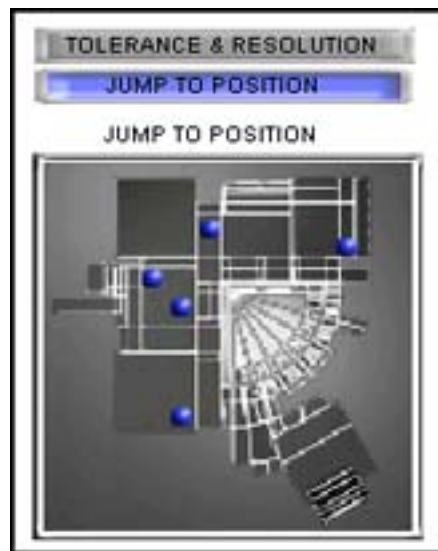
This application was developed to address this issue



The user can move around the building in real-time using the keyboard arrow keys. A 3<sup>rd</sup> person character is represented simply by a red cylinder we called "Dusty Bin". When Dusty hits a railing or a wall, he gets deflected. But there are some places where it is possible to get through the railings and "fall" 4 floors. This is not a problem – within the "Jump to Position" pane there are a number of blue spheres. By clicking on these Dusty get "transported" to the relevant pre-defined position.

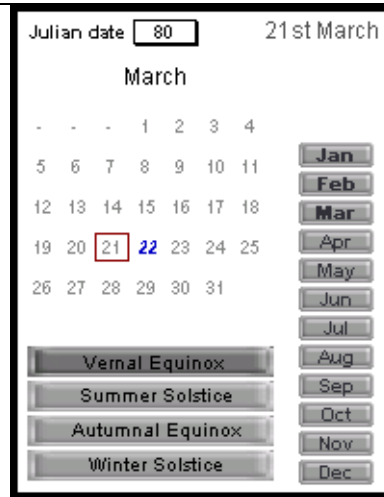
Various walls throughout the building have red borders – This indicates that there is data available for this particular wall.

All of the data is the output from a 2-week process by Radiance (Lighting analysis program). It analysed the aforementioned walls giving an estimate of total sunlight hitting each wall for every daylight hour for specific days of the year.

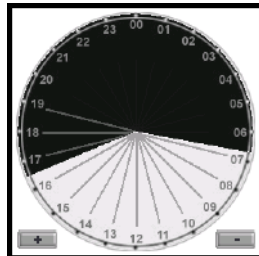


The user can select which day of the year they're interested in by either typing in a Julian date or they can click on any of the 12 month buttons and then select a date from the calendar view or they can jump to the 4 solstice / equinox dates. Certain months and calendar dates are shown in bold. This indicates that there is data available for this particular date.

As the user selects different dates the hours of daylight are displayed on the 24hr clock face.



Summer solstice



Winter solstice



While the user is “walking” through the building he / she can click on any wall that has a red border. The program will immediately display that wall in “False Colour”.

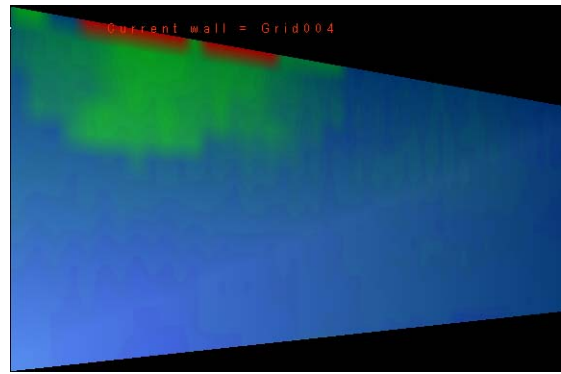
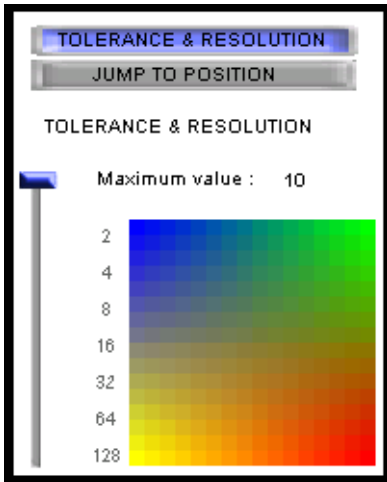
“False colour” is a way of describing a luminance surface so that areas of intense light (coloured in red) can be easily distinguished from areas of low light (coloured blue). There is key on the right-hand-side of the interface showing the luminance value that each colour represents.

The creation speed of the false colour wall is very much dependant upon processing power of the computer the application running on.

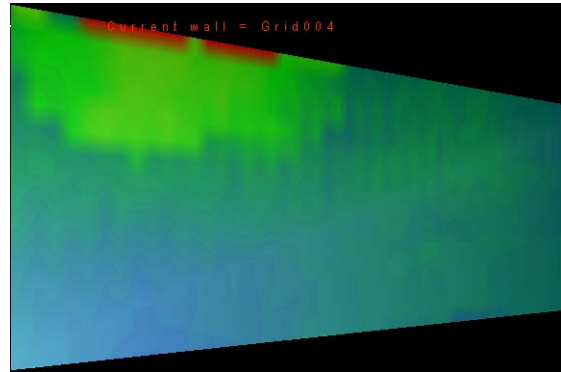
To speed things up, the user has the option to decrease the resolution of the false-colour image or increase the resolution if a less “Blocky” image with more colours is required. Here is the same view shown above (resolution = 32) but with the resolution set to 2.



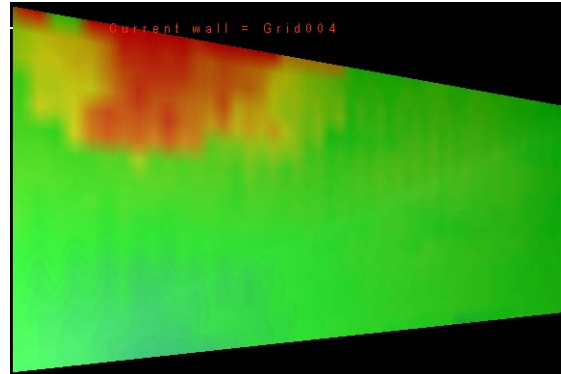
The user also has the ability to adjust the tolerance of the false-colour image by the use of a slider. I.e. by setting a lower Maximum value, the general shift of the colours will move more to the red side of the scale.



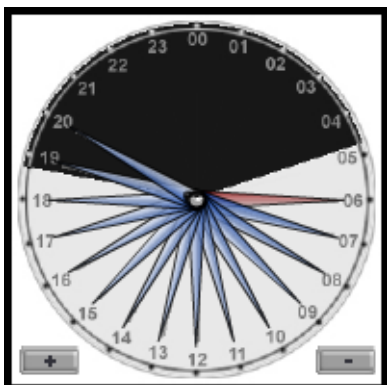
Maximum value = 1007 f.c.



Maximum value = 604 f.c.



Maximum Value = 301



While a wall is selected a number of “hands” appears on the 24hr clock. Blue hands indicate all the hours that there is data available for the currently selected wall. A single red hand indicates the currently selected hour. Users can select alternate hours by clicking on any of the blue hands or can increment / decrement the hours by clicking on the “plus” or “minus” buttons. Another feature while a wall is selected is the option to animate through the hours available. When this option is selected, the program generates an image for each hour and then creates “tweened” images for each half hour and then creates an animation fading between each image. This process can take quite a while so it’s best to set the resolution to a low value first. Other options available is the ability to isolate the selected wall. Sometimes it’s not possible to view a whole wall due to another wall being behind Dusty not allowing him to move far enough away. By clicking on the Isolate button all objects except the selected wall are turned off. The 3 images above were created in “Isolate” mode.

The user can also click on the “Annual Exposure” button. This generates a false colour image for an average of the daylight throughout the year.