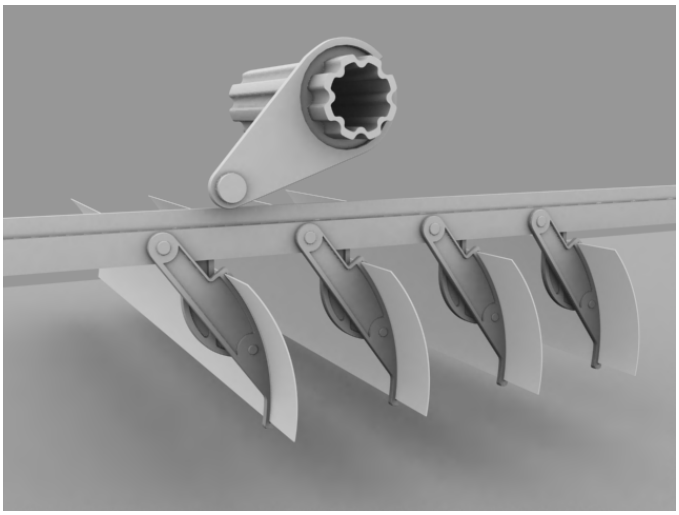
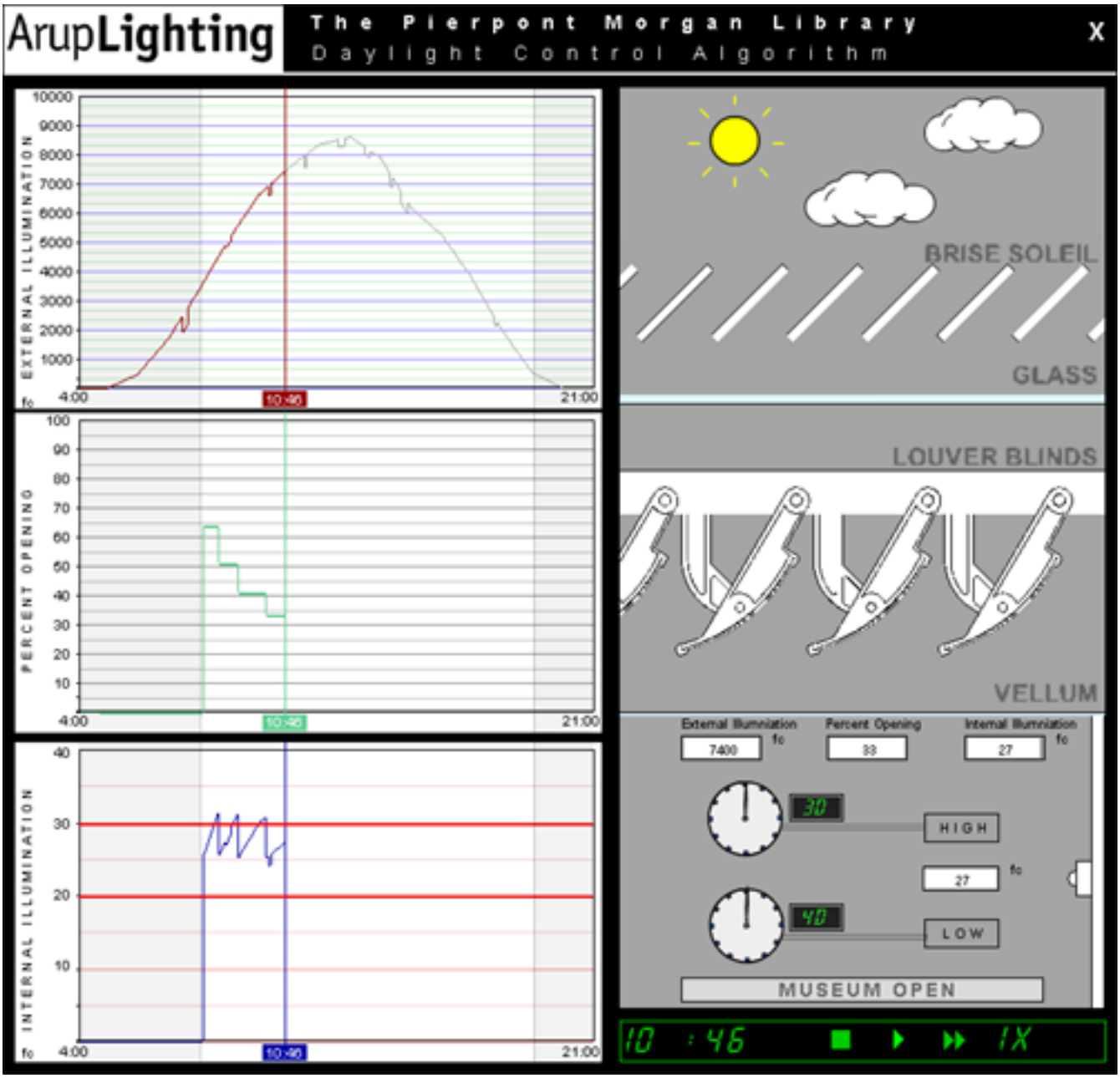


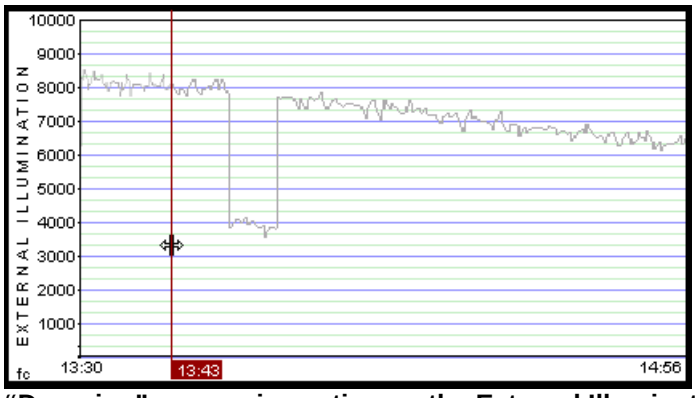
3D Model of the Levolux skyvane.

Daylight Control Algorithm

A large percentage of the work Arup Lighting do is for Museums and Galleries. It is essential to keep the light that falls on walls and other surfaces to an optimum.
This is usually achieved by a photo-diode on the wall connected to a motorised Louver system (shown left). This is a series of blades connected to a drive-shaft which causes the blades to open and close.
The whole process is more complex than the Louvers simply reacting to a light level and in order to demonstrate this process, we created this interactive application linked to actual daylight output for the specific area (in this case, New York).

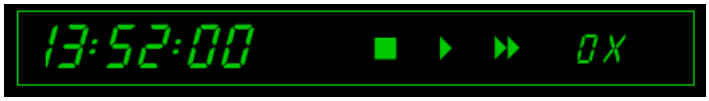


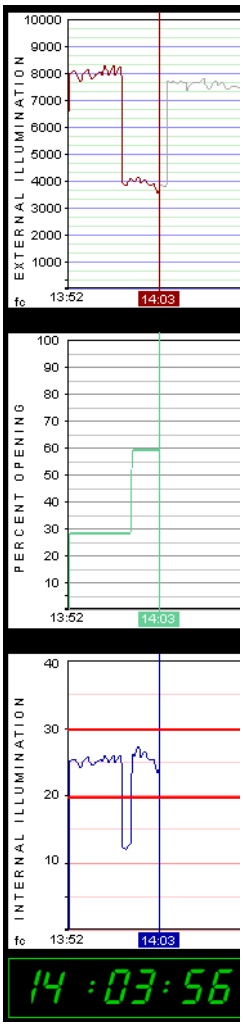
The program displays a number of line-graphs and schematic images of the Louver system and representations of cloud-cover. The top-left chart displays the “External Illumination" in foot-candles. As the application starts, it read the data in the associated files and plots it on this chart for the daytime period 04:00 to 21:00.
It is on this chart that the user can ‘drag’ a selection area thereby changing the active display period and in turn showing higher detail on the chart.



“Dragging” a zoom-in section on the External Illumination graph.

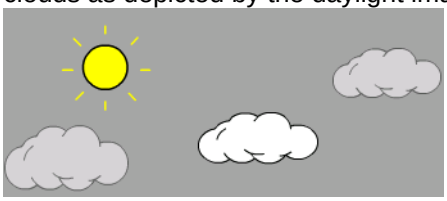
At the base of the interface is what looks like a VCR panel. Obviously this could have been made to look more authentic if it had 6 zeros flashing constantly but instead, by default, it displays the time on the computer system clock. As soon as a time period has been selected (by the process described above), that time will be displayed in this panel. By clicking the play button, all three charts will start drawing.



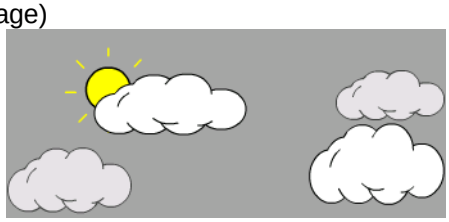


The image on the left shows the application drawing the 3 charts.
The top chart “External Illumination” is simply a re-draw of the grey line chart that has already been drawn when the user zooms in to a desired time period.
The values shown on this chart are then fed into the bottom chart, “Internal Illumination” This is a calculation of what the Illumination on the Internal wall would be based on the External Illumination, and light filtration via the “Brise Soleil”, Glass, Vellum and Louver Blinds covering the ceiling.
It can be seen that the Internal illumination is a direct ratio of the External Illumination. That is until a minimum or maximum value is hit.

On the top chart, it is possible to see a period of time where the External Illumination has suddenly dropped (i.e. where the sun has gone behind clouds as depicted by the daylight image)



“**Sunny**”



“**Partly cloudy**”

As soon as a High or Low point is passed, a timer is triggered and will start counting-down the pre-defined amount as specified in the settings file. If after the countdown is complete, the Internal Illumination is still high or low the Louvers will move by an amount to set the Internal Illumination halfway between the high and the low markers.

Using this setup in a museum or gallery, Arup Lighting are able to offer a system that completely controls the internal illumination without mechanical devices working constantly.