

## Information Paper

## Retrofitting solar shading

Paul Littlefair

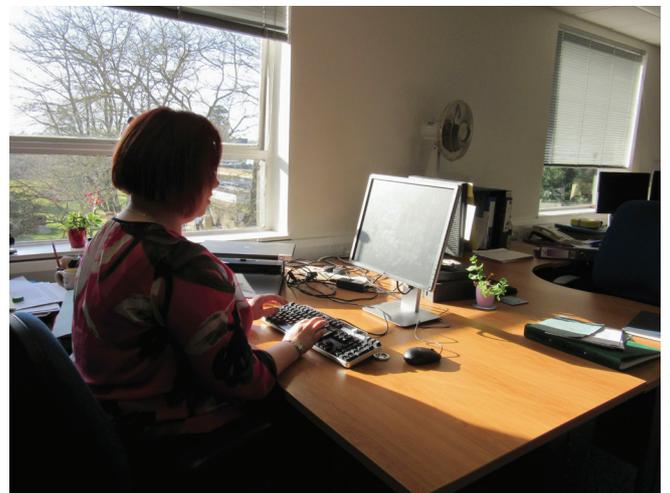
**Solar shading can have an important benefit on the environment in buildings by reducing glare and overheating, and can provide valuable savings in cooling energy. This Information Paper describes the shading systems commonly used in retrofit applications, and gives guidance on their selection and design. It will be of interest to building owners and facilities managers, energy auditors, interior designers and architects. It replaces BRE Information Paper 11/02, which is now withdrawn.**

### The benefits of shading

The need to control overheating and glare is increasingly important in all types of buildings<sup>[1]</sup>. Particular problems can arise in extensively glazed buildings, or those with intensive computer use. Glare can have a major impact on productivity as well as comfort. For people working on computer screens, uncontrolled incoming sunlight can make it almost impossible to work (Figure 1). There are legal requirements here: the health and safety regulations for areas with display screen equipment<sup>[2, 3]</sup> require that 'windows shall be fitted with a suitable system of adjustable covering to attenuate the daylight that falls on the workstation'.

Productivity and staff morale will also drop with high internal temperatures, and there may be adverse effects on health. In offices, productivity drops by 10% if the temperature is above 30°C<sup>[4]</sup>. A recent case study of a hospital in Cambridge<sup>[5]</sup> revealed significant overheating, and this is likely to be replicated in over 100 hospital buildings throughout the country, particularly as climate change takes effect. In the case study, solar shading, combined with effective natural ventilation, was predicted to reduce the incidence of overheating.

Compared with the alternative of installing air conditioning, solar shading can be a highly cost-effective way to control overheating<sup>[6]</sup>. A BRE case study<sup>[7]</sup> based on a typical 1960s open-plan office found that comfort could be achieved at zero cooling energy consumption, with a combination of solar



**Figure 1:** Here incoming sunlight causes glare to be reflected from the computer screen, decreasing visibility. Additional glare comes from bright sunlit patches on the desk

shading (either mid-pane or external) and night ventilation. The extra cost of such measures will usually be substantially less than that of installing cooling. Even in a building where cooling had already been fitted, the shading could pay for itself in under five years.

Solar shading can be particularly effective as part of a package of 'passive' measures to limit overheating. These include night ventilation and the use of more efficient equipment and lighting controls to limit internal heat gains. Solar shading is of particular value here because it can reduce the variations in internal temperature that can occur on sunny days.

Some types of solar shading also reduce heat loss in winter<sup>[8, 9]</sup>. In addition, shading can help to protect sensitive objects like paintings and museum exhibits.