#6578

Facade of the future?

The architects of Tanfield House, the Michael Laird Partnership, developed a special facade detail to enable natural ventilation to be achieved without draughts. Here's how they did it.

As clients demand 'greener' buildings and more healthy workplaces inside them, architects and building engineers will increasingly have to design for passive cooling and natural ventilation.

Doing this without raising costs and compromising comfort conditions will take more than providing openable windows and an exposed soffit.

Although Tanfield House is very much a one-off design, it has aspects that could be adopted for future buildings.

As the client did not want a sealed air conditioned building, careful consideration was given to how the building fabric could function as a climate modifier.

Double wall

The double wall detail around the building's perimeter is the most obvious refinement which, in addition to providing the means of routing main perimeter services, also functions as a buffer zone between the occupied office areas and the external environment.

Using an extruded aluminium frame, specially developed by Ruberoid, the external wall consists of two glazed skins. The outer skin acts as a weather screen, open at the top and bottom to allow the free passage of air through the cavity between the skins (figure 1).

This modifies the adverse effects of wind or rain on the opening lights in the inner skin, and improves the thermal performance of the exterior envelope of the building.

Daylighting specialist Friedrich Wagner of Vienna devised a scheme whereby the inner glazing is tinted, but the outer glazing is of clear glass.

The clear external skin allows the sunlight penetrating into the wall system to heat up the air cavity, reducing the heat loss through the wall in winter.

As it still acts nominally as a cold radiant surface, the inner glazing is supplied with warm air perimeter heating by finned convectors to combat down draughts.

In summer the solar gain increases the stack effect, ensuring a flow of air through the void and aiding natural ventilation.

The glass in the inner skin is tinted grey to reduce daylight penetration by a claimed 73%, which reduces solar gains and controls glare.

User control

Occupants can reduce the glare factor further by deploying manually-operated perforated blinds, which operate on a simple roller blind mechanism. This blind is claimed to reduce daylight glare to about 19% of the light transmitted throught he glass, or about 7% of the original daylight level.

Those windows on the south facing elevation and thus affected by direct sunlight have a second blind of translucent material. This obscures the direct rays of the sun while allowing light to be seen through it.

All the lower halfs of the windows are openable. As they are sash windows, it obviated the need for complicated locking assemblies and also allowed control of the openable area.

Every second upper sash window is held in place by an electro-magnetic lock, which trips under a fire alarm condition to allow extra make-up air to enter the building (irrespective of the position of the lower sashes) and aid smoke extraction.

The walkway grilles in the double wall system also act as solar shades, cutting off the penetration of direct summer sunlight into the office areas.

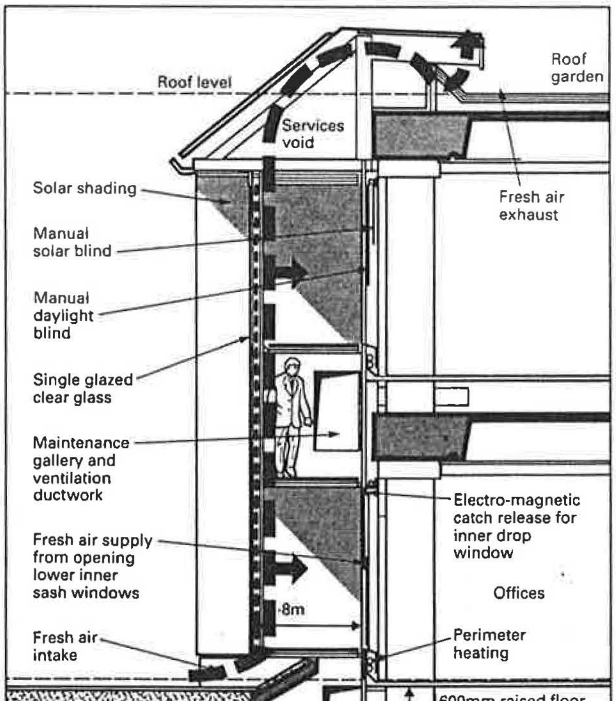

Figure 1: The double wall acts as a thermal buffer zone.

Maintenance

In addition to functioning as a thermal buffer zone, the double wall system also incorporates the main office air distribution ducts, vav units, humidifiers etc, on each floor.

Maintenance access is possible without disturbing the activities of building occupants, a major problem when servicing underfloor vav systems.

The first floor is serviced from a basement plenum, while the second floor has a services walkway approximately equal to the height of the slab and the 600 mm raised floor.

With localised air handling in each of the vertical perimeter risers, this meant that a percentage of the gross area became plantroom area. If this facilitiy had not been available, presumably more internal risers would have been required.

The length of the external wall is relatively small for such a large floor area, thus minimising the amount of construction material and the heat loss through the exposed surface.

However, the net to gross calculation is still not brilliant, given the norms set by the commercial office market. But direct comparison with curtain-walled speculative offices cannot be made without bearing in mind occupants' control of daylight, artifical light and ventilation, and the lower maintenance costs that accrue from Michael Laird's design at Tanfield House.

Further information on the office planning of Tanfield House is contained in *Premises & Facilities Management*, September 1991.