Low energy cooling

Good Practice Guide

5.3 Night-time cooling/'purging'

As mentioned above, where a building makes use of high thermal mass (e.g. masonry, concrete or new 'phase change materials') to absorb heat and thereby moderate internal daytime temperatures, night-time 'purging' can be used to dissipate the heat stored in the building fabric. This is critical where thermal mass is high to ensure that temperatures can be reduced sufficiently for the next day's use (opening windows during the day will have little effect on the temperatures in such buildings, since they store a lot of heat and therefore a lagged response and fast, close control of temperature is not possible). Purging can be achieved passively, or by using mechanical fans to drive air flow (although the latter obviously involves energy consumption), through ventilation of floor voids or the floors themselves using louvred vents. Stack ventilation is particularly effective for night time passive cooling as this is when there is the greatest differential between internal and external temperatures.



Case study 3:

Given concerns about the reliability of complex cooling solutions and their effective operation by building users, this modern office development adopts a simple, low maintenance, low energy solution to meet its cooling requirements. The office combines a considerable thermal mass with ventilated louvres backed by doors into the building that are simply opened at the beginning of the summer to let the cool night air in, and closed in the autumn. The result, according to an occupier, is 'the only green building we occupy that actually works'.

Thermal mass is provided at no additional material cost by using engineering brick seconds throughout, with precast concrete floor planks, creating a reassuringly solid-feeling building. However there is a time cost: the rate at which brick courses can be laid is reduced as the bricks' weight displaces the mortar and the exposed floors have a significant drying period. Where an internal finish to the brickwork is needed, the wall is rendered rather than plastered but optimally, brickwork is left exposed and simply painted, giving the added benefit of increasing net lettable floor area.

The ventilated louvres allow cool night air to flow through the building, passing over the exposed heavy construction and pre-cooling it for the following day. Modelling of air temperatures indicated that with reasonable assumptions abou heat gains and provided the louvres were open overnight the temperature would be at 25 °C or below for 95% of the occupied period over a year. This meets the British Council for Offices recommendation for naturally ventilated buildings. Security concerns were overcome by using heavy duty extruded aluminium slats and a stainless steel mesh keeps out birds and insects.

ource: Bill Reed, Reedspace Ltd; www.reedspace.com/pdfs/aecasestudy.pdf