

Adaptive Natural Ventilation In Education

Whether you work in a factory, office, shop, hospital or school, your environment is vital to your wellbeing and productivity, and with the current, understandable drive to make buildings healthier and more energy efficient, the focus is now very much on the work place.



The Kyoto agreement, the climate levy change and changes to Part L all need to be considered when looking at the energy efficiency of buildings. Considering the fact that the servicing of buildings produces about half of all UK carbon emissions, it is clear to see why - and this is just the beginning.

The internal environments of schools are even more important. The places that will educate and nurture our next generation are, apart from the home, the most important and influential surroundings that our children will ever come in contact with, and the places where good ventilation and indoor air quality control is paramount.

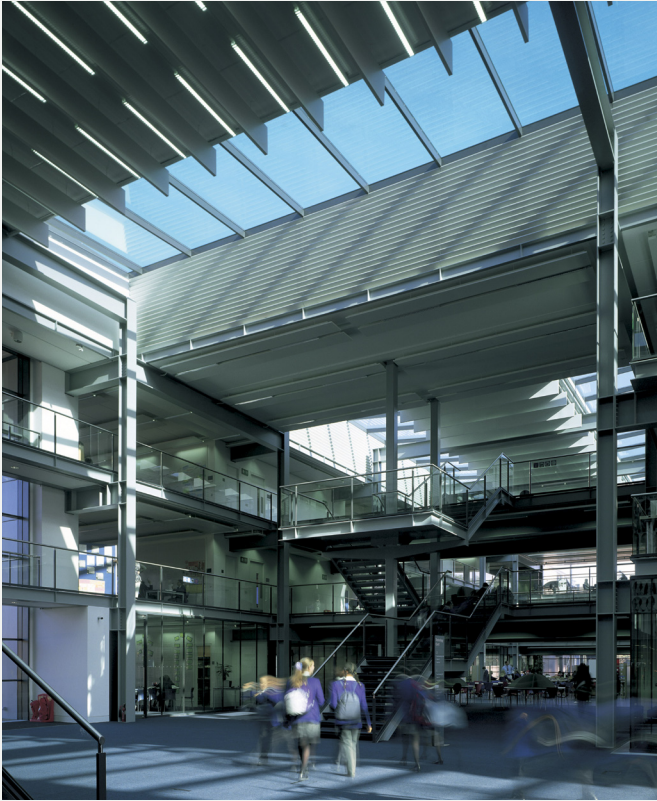
The importance of clean fresh air at a comfortable temperature cannot be overstated. A proven method of reducing 'sick building syndrome' is by ensuring fresh, clean air is delivered into a building. This will have a positive effect on our everyday lives, helping to produce a stimulating environment for work and education. Fresh cool air also has the benefit of eliminating the need for air conditioning, one of the largest culprits of energy use in commercial buildings. For many years, getting fresh air into a building simply meant opening a window. However, this offers little control, and in most environments, is simply not enough. That's where Adaptive Natural Ventilation systems come into their own and a wave of new academy schools is embracing this technology to help create the perfect learning environment.

The academies are a new wave of modern schools which aim is to provide a unique environment where an innovative curriculum will prepare the students for the world of work and university. Part of the government's radical new approach to raising educational standards in areas where there are, at present, problems of under performance, they provide state of the art facilities that really make them stand out from other educational facilities, taking advantage of information technology, including video-conferencing, interactive whiteboards, Internet and e-mail.

With such a focus on creating the perfect learning environment, it is no wonder that many of the academies have looked to adaptive natural ventilation as a method of controlling the quality of the internal air, and in turn providing students with a more healthy, comfortable learning environment.

Working with leading developer of natural ventilation solutions SE Controls, architects Foster and Partners has created natural ventilation systems for Bexley Business Academy and Capital City Academy.





Architects Curl Le Tourelle, also working with SE Controls, has created a similar system at Peckham Academy.

Natural ventilation is quite simply ventilation that is driven by the natural forces of wind and temperature. There are numerous ways of controlling natural ventilation such as openable roof windows, rooflights, domes and louvres, windcatchers, openable windows in the building façade and trickle vents in windows and doors. There are also several types of natural ventilation – cross ventilation, stack ventilation, passive cooling and mixed mode.

These systems are now becoming common place in modern buildings as they offer significant energy and maintenance cost savings when compared to alternative solutions such as mechanical ventilation and air conditioning. In recent tests based on data from CIBSE looking at the ventilation of the first floor of a two storey building, the capital costs plus the annual energy consumption and maintenance costs for partially centralised air conditioning with fan-coil units was calculated at up to £585,600 compared to roof mounted wind driven ventilators with a capital cost of £92,000, with no energy consumption costs and minimal maintenance costs. The benefit is easy to see.

For maximum effectiveness, these systems can be integrated into Building Management Systems (BMS) providing an intelligent, fully integrated system that works with the building.

At Bexley Business Academy, Foster and Partners and SE Controls created a solution that utilised SE Controls' OSO control system, linked to the BMS, enabling windows in the façade to be automatically opened and closed via window actuators. Utilising the same Lonworks building language as the BMS, the OSO system provides a seamless control system, avoiding the all too common problem of incompatible interfaces.

The system can be programmed to the exact requirements of the building and the occupants, enabling the creation of a fresh, healthy atmosphere via regular air changes within the building. This is achieved by monitored CO2 and temperature levels in relation to occupancy and time periods. In short, if the temperature and / or the CO2 levels rise above a set parameter, which can be governed by time and occupancy, the OSO system calculates which windows to open to return the temperature and CO2 levels to an acceptable state.

A series of OSO BMS interface controllers is positioned around the building, each having control over a set number of openers - in the case of Bexley Business Academy, windows in the façade.

The system is completely reprogrammable from any of the interface controllers allowing users to change operating parameters, time and temperature settings, window opening distances and groups, offering total flexibility and control to the users.

Windows can still be opened locally, allowing students and teachers to have control over their own space. However, if the BMS identifies that any have been left opened after a set period, for example, the end of classes, it sends a message to the windows and closes them, or repositions them to the correct setting.

At Capital City and Peckham Academies, similar systems have been integrated providing the students and teachers with an intelligent, easy to control and environmentally friendly method of creating the ideal learning environment.

Taking the system one step further at Bexley Business Academy, the system has had additional functionality included by linking it with the fire detection routines. In the event of a fire, the system opens the windows and overrides any natural ventilation status to contribute to the smoke ventilation strategy enabling safe escape. The OSO controllers are failsafe in this mode and continue to operate in a mains power failure condition.

The importance of creating the perfect working environment cannot be overstated. With the increasing move towards environmentally friendly and also cost effective alternatives to create that environment, it looks like natural ventilation could hold the vital key.