FEATURE

FANS & VENTILATION SYSTEMS

Indoor air quality is assuming an ever-higher profile in the provision of safe and comfortable environments within buildings. As buildings become ever more airtight, so mechanical ventilation is a necessity.

Ensuring indoor air quality

There are many reasons why the air quality in a building may fall well short of what it was intended to be, explains Trevor Catten.

In discussing controls for ducted air systems in buildings one must bear in mind why air is being supplied by mechanical means in the first place. Is it solely to provide an atmosphere in which occupants can breathe (hopefully) untainted air, or is the air also being used as a heating or cooling medium to maintain thermal comfort for occupants?

If the latter, as in most commercial and modern office systems, the potential conflict between saving energy costs and providing satisfactory indoor air quality becomes apparent.

Even if the system is solely providing replacement outside air, other means inside the building must be found both to temper incoming air temperature in winter and provide a thermally acceptable environment for occupants.

Where water is used as the cooling or heating medium, it is recirculated continuously and safely inside pipework, where it may progessively pick up sludge or have aggressive chemicals added to it without the risk of consumption by people.

Unlike water, which sits obediently locked away inside pipes and services, or behind taps awaiting consumption, we have no choice but to inhale air wherever we find ourselves.

Even when controlled inside ductwork with dampers, air also flows invisibly and freely across all surfaces and occupants inside the served areas. Wherever you find it, either inside plant, ductwork or the served areas, air must be fit for human consumption.

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Apart from careful siting of the fresh air inlet, the building-services designer has little control over the quality of outside air imported into the building. Thereafter, however, choices may be made on the quality and adequacy of filtration, and the proportion of outside air which will be added to the air recirculated in the building.

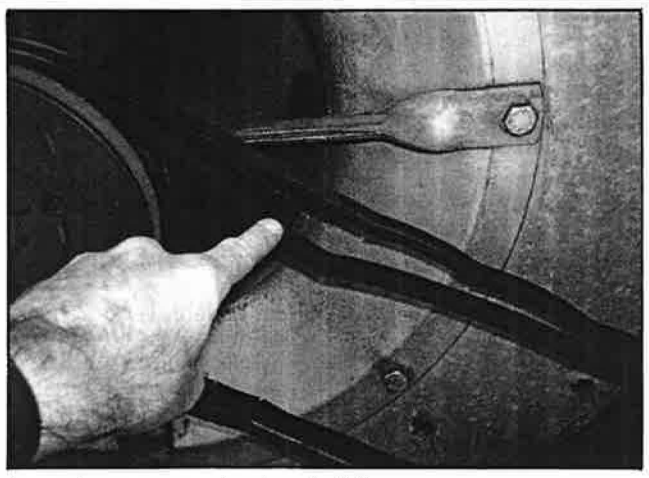
The balance that has to be struck is between providing sufficient supplies of fresh air, at the lowest possible energy/financial cost. It is here that controls, properly designed and intelligently operated (with ensuing conditions *monitored*) can play their part.

Contaminants

It stands to reason that the more accurately the emission or build-up of airborne contaminants can be identified, the more accurately the balance between fresh air dilution and energy conservation may be achieved.

As each building, its population, and the use to which it is put add up to a unique combination, the amount and rate of production of internal-air contaminants are bound to vary from building to building and from time to time.

The seasons alone account for widely varying conditions both inside and outside. Photochemical smog and pollens can occur in summer. In winter, boiler flue emissions are greater, and the humidity of the outside air is lower.



Cause for concern – despite a building-management system indicating that all is well, a fan may not be running properly because its drive belt is slipping, leading to a deterioration in indoor-air quality.

A recent research paper from the Building Research Establishment (IP 3/94) shows that unwanted additives to the air circulating inside buildings may include dusts which originated from the air-supply system, but may equally include dusts, fibres, gases and microbes either brought in by occupants, or derived from the many synthetic materials used in modern buildings and office furnishings.

Pollution

It is normal for clients to change partitioning layouts and population densities, increase sources of 'pollution' in the form of new carpets and furnishings (with attendant temporary increases in airborne fibres and gases), without any changes to ventilation rates or distribution patterns being made to compensate.

Under these circumstances, it is again important to know whether the airborne contamination 'signature' of the area is overwhelming the ability of the ventilation system to cope, or indeed, whether the area is overventilated — with its attendant avoidable costs.

A useful indicator of ventilation adequacy is the level of carbon dioxide in the air. Carbon dioxide is a by-product of breathing, and the higher the level that builds up inside a room, the poorer the ventilation. If carbon dioxide levels are restricted to the widely adopted acceptable level of 1000 p.p.m. or below, any other contaminants originating inside the offices are likely to be adequately diluted.

Monitoring

Assuming correct design of the ventilation system in the first place, monitoring of the air quality is necessary to *confirm* that controls are working. This may at first sight seem unnecessary, but apart from the occupant reassurance aspect (which is considerable) it is not impossible for building-management systems to unwittingly record the opening of fresh-air inlet dampers when the actuator linkage is disconnected from the louvre blades, or show that a fan is running when it is simply the motor (the fan belt having broken) or, worse still, a fire damper having dropped inside the main supply duct to the chairman's suite!

Regular or continuous monitoring of the key airborne particulate and gaseous contaminant levels will equip building-services operators with the information needed to achieve optimum conditions, ensure that controls are remaining effective, and maintain the balance between comfort, healthy indoor air quality and energy conservation.□

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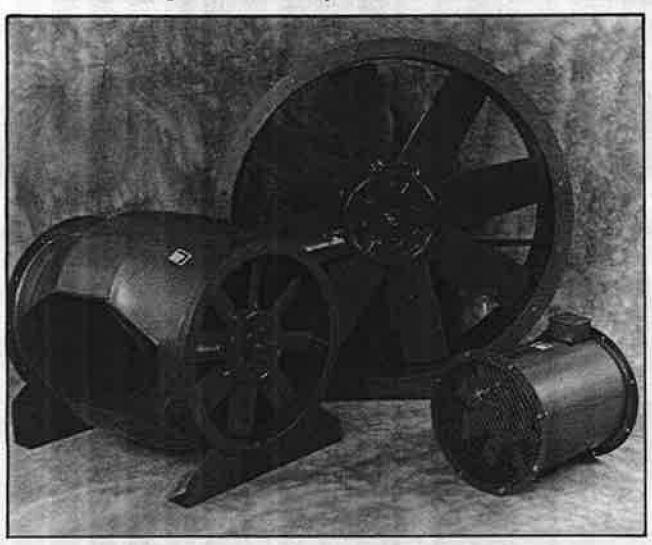
Discus aimed at HVAC users

Independent fan manufacturer Standard & Pochin is aiming its Discus axial fan range primarily at the HVAC market.

The range, described in a 12-page colour brochure, includes bifurcated, high-temperature, belt-driven and flameproof units.

Plastic-bladed impellers are available up to 1 m diameter for general air removal duties, and aluminium and steel-bladed fans up to 2 m diameter for higher temperature applications such as smoke removal.

The aluminium-bladed fans are rated at 300°C for 60 minutes, and the steel-bladed versions will resist 600°C for 30 minutes.
Reader Reply No. 120



Standard & Pochin's Discus range of axial fans includes bifurcated, short-case and long-case versions.

Clean air for clean rooms

Comprehensive guidance on the range of air filters for clean rooms is given in a new brochure from Vokes. The range includes terminal filter ceiling modules that can be installed directly into ductwork systems and separate panel absolute filters and terminal housing.

Vokes' clean-room filters are available with efficiencies of 99.999% (HEPA) and 99.9999% (ULPA) for particle sizes over 0.3 micron. They are suitable for use in laminar flow benches and clean rooms requiring environmental control to US Federal Standard 209 E(D) and BS 5295.
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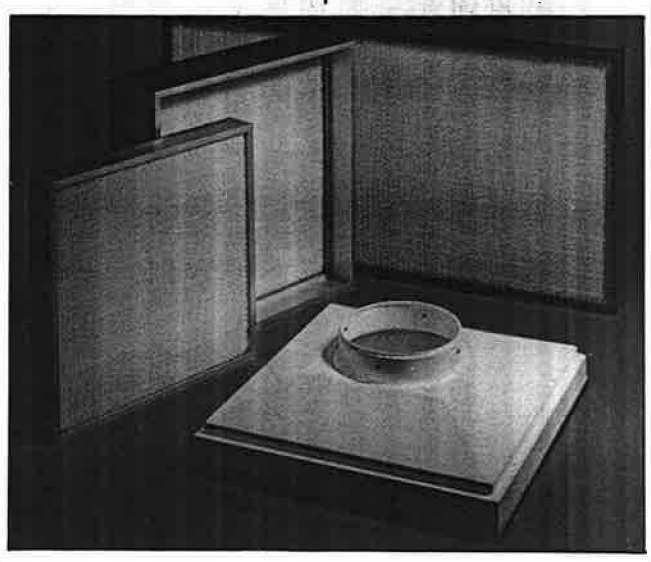

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