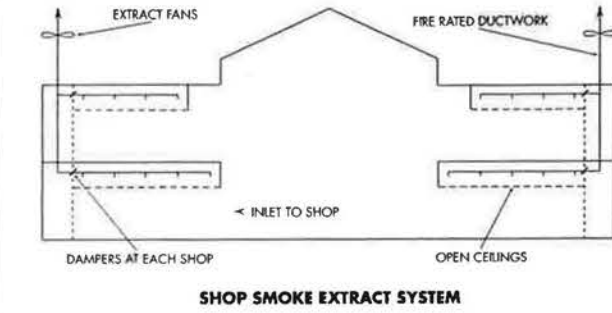


Shoppers face fiery issues

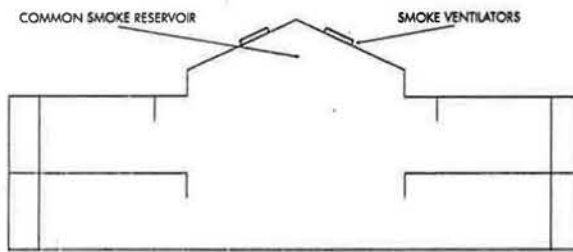
Ken Major argues the benefits of smoke ventilation in the malls of enclosed shopping centres.

There are two principal methods of controlling smoke in enclosed shopping centres — mall ventilation and shop extract. The former aids evacuation by holding smoke at high level in predesignated reservoirs, venting it out via a common extract system with replacement air drawn from unaffected reservoirs. The latter extracts smoke directly from the shop on fire, usually through a large common duct at the rear of the shop.

In shop-extract systems, dampers inside the shop on fire open into the duct, those in all other shops connected to the duct remain closed. A shaft rises from the common duct to a fan at roof level. To prevent smoke from flowing into the mall itself, every shop unit, even small kiosks, must be fitted with individual extract systems. A central control system opens the dampers to the shop on fire, ensures all others are closed, and starts the fans at roof level. Shop extract systems must be capable of withstanding very high smoke temperatures and, because it passes through



If shops are served by a smoke-extract system, dampers connect each shop to a common smoke-extract system, and open only if there is a fire in that shop.



With the mall smoke-ventilation system, smoke from an affected shop passes into the mall, from where it is extracted through the roof.

compartment walls and floors, the ductwork must be fire rated.

Impossible

Specifiers should note that, because smoke extract systems must handle volumes approximately 10 or 15 times higher than ordinary ventilation systems and

possibly at temperatures significantly higher than ambient, it is impossible for environmental ventilation systems to double as smoke-extract systems. Moreover, because they are designed to distribute air throughout a building, day-to-day ventilation systems must be shut down on detection of smoke.

“Effective and efficient management of the safety systems in shopping centres demands that they be under unified ownership and continuing control”

Mall-extract systems are designed so that the smoke passes into the mall where it mixes with the surrounding air, increasing the volume to be extracted from the mall roof. Shop-extract systems, therefore, require a lower extract capability than mall systems. Moreover, fires confined to individual shops cause less smoke damage and, by their very nature, create

less of a disruption to the overall running of a centre.

Responsibility

The cons, however, outweigh the pros. Effective and efficient management of fire safety systems in shopping centres demands that they be under unified ownership and continuing control. Yet, in shop extract terms the delegation of responsibility is from the landlord to the individual tenant who may be unlikely to fully appreciate the importance of smoke control. For example, imagine a tenant who, during an interior re-fit, installs a false ceiling below the extract duct in his shop rendering the smoke extract system useless. In contrast, because mall systems are installed in common areas, the responsibility for maintaining the system lies with the centre's management rather than its tenants.

“It is impossible for environmental ventilation systems to double as smoke extract systems”

Adequate provision must also be made for inlet air, which is essential to replace the smoke extracted from a shop. The velocity of inlet air should not normally exceed 5 m/s or it will cause difficulties for shoppers trying to escape. Such high velocities can be prevented by having a large opening in the shopfront, either permanent or opening on detection of smoke at the same time as the extract goes into operation. With a mall-based system, however, inlet air will be available from doors or natural ventilators in neighbouring zones.

Shop-extract systems also generally require fire-resistant downstands at the front of the unit to prevent high-level smoke entering the mall. Smoke must be able to permeate false ceilings to reach extract points. Moreover, the relatively shallow depth of the smoke layer in a shop demands a duct at high level incorporating extract grilles to prevent 'plug holing'. This obviously has implications

for the design of shop units. Mall-ventilation systems, in contrast, make no such demands on the shop unit and, in many cases, the downstand fascia on the shopfront is not necessary.

Testing

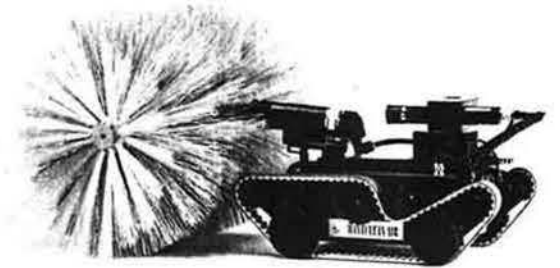
Shop-extract systems in a large centre require considerable testing and maintenance. Testing of individual units is essential to ensure that the correct dampers open and fans start up immediately

smoke is detected. Clearly the inherent simplicity of a mall-based system means there is less likelihood of it failing than a system reliant on a complex network of back-up generators, fans, ductwork, controls and dampers.

The most serious disadvantage of a shop-extract system is its inability to deal with a mall fire, whereas a mall-based system designed for shop fires will have more than sufficient capacity to handle a comparable fire in the mall. For example, in a two-storey mall, smoke will be extracted from a shop fire at a typical rate of 100 kg/s.

Continued on next page.

Making a clean sweep of ducts



This device is not a children's toy but a remote-controlled robot for cleaning ventilation ducts. Bandy II was developed by the Swedish company Wintclean Air in response to that country's legislation requiring that ventilation ducts must be inspected for function and cleanliness.

The robot is fitted with rotating brushes powered by compressed air, and has a mobile video camera mounted on the front. It is controlled remotely using a joystick and can travel up to 30 m.

Reader Reply No. 122

NuAire enlarges MicroSave range

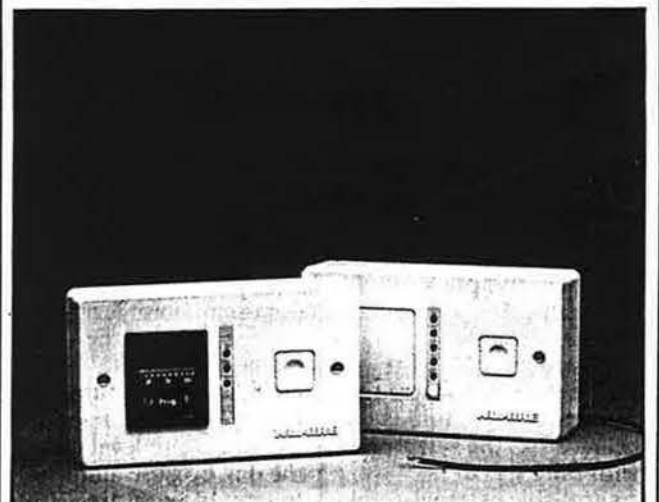
NuAire has launched the second generation of fan controls using MicroSave technology — which uses low-voltage 4-core cable instead of mains cabling. The new starters and speed controllers are designed for the Chieftain and RoofMaster roof-extract fans and AirMover mixed-flow fans for

installation in square ducts.

Just a quarter of the size of conventional fan-speed control boxes, MicroSave units are the equivalent of a double power socket.

These controllers are compatible with building and energy management systems.

Reader Reply No. 123



The size of a double-gang power socket, NuAire's MicroSave fan controllers use low-voltage cabling.

Mixed-flow fans

Two-stage mixed-flow fans from Vent-Axia can provide outputs of over 0.5 m³/s. The top-of-the-range package is just 540 mm wide and 290 mm deep, highly practical for the gap above suspended ceilings. At the smaller end of the range is a unit 125 mm deep and 175 mm wide.

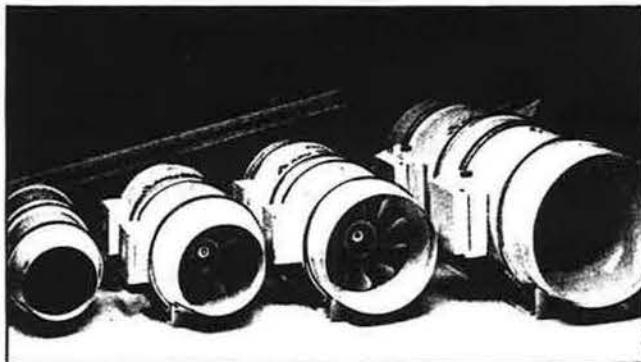
The tandem-mounted fans provide over 500 Pa. Where double the airflow is required, two fans can be installed in parallel by a twin-base kit, which includes end-connection flanges for rectangular

ducting and a mounting base.

For ease of installation and maintenance, the mounting base can be fixed and the ductwork attached before the motor housing is wired in and secured with two screws.

Vent-Axia also offers a full range of ductwork accessories — flexible ducting with a 30 minute fire rating, wall-termination sets, back-draught shutters, pre-filter cassettes, supply and extract diffusers and joining pieces.

Reader Reply No. 121



Providing throughputs of up to 0.5 m³/s at 500 Pa is this range of two-stage mixed-flow fans from Vent-Axia.

from previous page

Smoke from a fire of the same size in the mall may require extraction at only approximately half this rate.

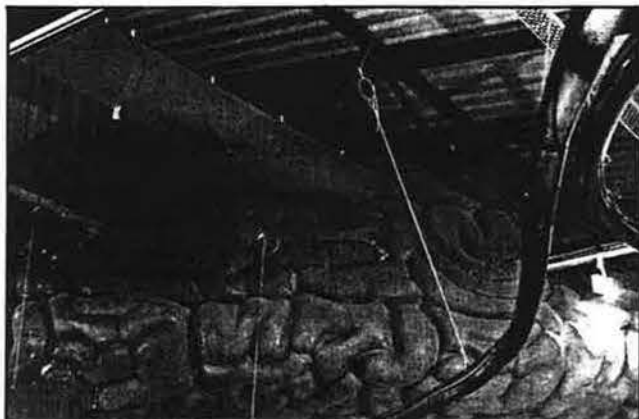
Safety advantages

Mall-based systems also have safety advantages. natural ventilators are held closed by a pneumatic air supply. If a failure occurs, the ventilator opens automatically. Mall ventilators can also be used for summer ventilation, reducing air-conditioning costs whilst ensuring that the system receives regular use.

It is for these reasons that virtually every

shopping centre has a mall-extract system. They are less restrictive to tenants, lower in cost and — being installed in the landlord's area — are easier to maintain. Whilst most other building services can be tested and commissioned before handover, a smoke-control system is never fully tested until a fire occurs. Complex high-maintenance systems which do not fail safe should be avoided. Simplicity is the route to reliability and safety. □

Ken Major is director of the contracting division of Colt International Ltd, New Lane, Havant, Hants PO9 2LY.



Archimedes, whose famous exclamation inspired the name of the Eureka Children's Museum in Halifax, hangs among the green ducts of the Tranquillair air-distribution system.

Museum services

The bold colour scheme at the Eureka Children's Museum in Halifax, Yorkshire, is matched by the ducting of the air-distribution system. A constant, even and gentle flow of fresh treated air is circulated around the building through brightly-coloured textile 'socks' between the roof beams.

The Tranquillair air-filtration and distribution system was supplied by Industcool Engineering of Eastleigh, Hants, for the 4300 m² building, which can accommodate up to 1900 primary schoolchildren at a time.

The 101 sections of textile ducting that run off the central ductwork are

fed either cooled or heated air from a heat exchanger. Extract air passes through a thermal wheel for heat recovery.

A 943 supervisor provides central monitoring and control via Trend IQ controllers. Carbon dioxide levels are also monitored so that fresh air can be brought in as required.

For maintenance the ducts, which for this installation are polyester, are removed so that dirt accumulated during air filtration can be washed away. In the museum the work is done in batches and does not interfere with the visitors.

Reader Reply No. 125

Fan control saves energy

Control specialists Colledge Trundle & Hall have introduced a package of hardware and software to prevent the unnecessary operation of air conditioning and ventilation fans.

Fancheck is designed for premises where occupation levels can vary widely and frequently, such as supermarkets, shopping malls and theatres. The electricity savings in such applications normally mean that the payback period is quite short, possibly less than 12 months.

The controller works by switching off the supply

and extract fans when air quality, as measured by a CO₂ monitor, is satisfactory and temperature conditions have been met.

The main hardware elements are a Trend IQ93+ intelligent controller, a Horiba CO₂ analyser and, if necessary, a space temperature sensor. The system is customised by modifying the software strategy.

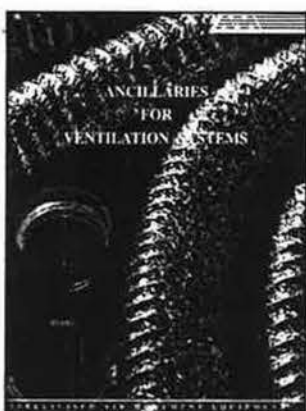
There is also a version of Fancheck which can provide damper control to introduce fresh air when carbon dioxide levels are unacceptable, thus minimising fan run time. **Reader Reply No. 126**

Ventilation guide

Specialised Air Movement Equipment has published a new guide to ancillaries for ventilation systems. The 40-page colour booklet covers flexible ducting, attenuation, fire dampers and valves.

Also included is information on the company's Centrex fans, the Studio range of domestic ventilation fans, the Flatpak ducting system, humidity-controlled fans, Saturn ceiling fans and Jupiter de-stratification fans.

Reader Reply No. 124



40 pages of guidance on ventilation ancillaries are available from Specialised Air Movement Equipment.



Colledge Trundle & Hall's Fancheck prevents unnecessary operation of air conditioning and ventilation fans in buildings where there are great variations in occupancy over time.

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