

Discreet comfort

Refurbishment projects often require effective control of comfort conditions within strict aesthetic constraints. **Rinus Groenewald** of Unico explains why small-duct high-velocity air-conditioning systems can offer a discreet alternative to other solutions.

A common challenge with refurbishment is to provide a comfort control system that meets performance criteria without conflicting aesthetically with the carefully designed décor. This may make traditional, yet conspicuous, elements such as grilles, fan coils and indoor air-conditioning units undesirable.

One alternative is small-duct high-velocity (SDHV) systems, combining minimum visual impact with low-noise operation, efficient control and excellent temperature distribution. They are also relatively straightforward to retrofit to an existing building.

For example, in the refurbishment of South East Coast Ambulance's control centre, three fully automated SDHV systems were installed. These were integrated with air-source heat pumps and heat-recovery units to deliver climate control and demand-controlled ventilation through the same acoustically lined duct in the ceiling void.

SDHV systems use central air distribution to deliver conditioned air to small, discreet outlets in the conditioned spaces. The only visible elements of the system within the space are the small circular or slotted outlets — with the ability to combine the latter to create single linear slots.

To meet very demanding aesthetic constraints at a prestigious property in London's Belgravia, flush-mounted circular outlets were used, plastered in so that only 50 mm apertures are visible. The two systems have air-handling units (AHUs) in the loft space with main ducts running to the five floors below. They are interfaced with reverse-cycle heat pumps and controlled through a building management system.

With SDHV, conditioned air

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enters the space through very small jets, creating negative pressure and entraining room air at the outlet with minimal noticeable air movement. This entrainment of room air results in very even temperature distribution and compares favourably with cassettes and wall-mounted air conditioners, radiators and underfloor heating.

A system can be designed with outlets blowing down or horizontally from high level, or even at floor level blowing upwards, with no discernible difference in heating or cooling performance.

The most common energy source for these systems is a reverse-cycle heat pump, but other options include boilers and chillers with optional bivalent operation for mixed sources.

Most SDHV systems use modular AHUs to allow different configurations and to suit the space available.

Air is distributed from the AHU through a main plenum at a reasonably constant static pressure of around 300 Pa. The main plenum is available in a rectangular 150 mm high section and incorporates acoustic insulation to provide attenuation of up to 5 dB/m. The main plenum can be branched off to serve multiple spaces — controlling each room individually with motorised dampers.

From the main plenum, or plenum branches, air is distributed into small, pre-insulated flexible ducts with 50 mm internal diameter and 90 mm external diameter. Each flexible duct is connected to an individual room outlet.

High levels of acoustic attenuation throughout the system deliver typical sound power levels of around 29 dB(A).

SDHV systems are highly controllable, combining demand-controlled EC fans with soft start and ramp down of the fan motor and the option of inverter-driven heat pumps. Each system will have a room thermostat or, in the case of zoned systems, there will be multiple room thermostats. Thermostat options range from basic digital units through to WiFi-enabled smart thermostats or, alternatively, BMS integration.

With its ability to deliver comfort control that is comparable to, and often better than, other systems, SDHV technology provides a solution that meets both the aesthetic and performance criteria of many refurbishment projects.

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Conditioned air entering the space through very small jets entrains room air to achieve a very even temperature distribution.

