

## TECHNICAL FILE CONTROLLING VENTILATION NOISE

Passive sound attenuation takes up space, increases pressure drops and raises the cost of an air handling unit. ABB is proposing to filter out unwanted noise electronically with its Aktipass technology.

BY RODERIC BUNN

# Active noise control in ventilation

An air handling unit (ahu) can be a noisy beast. Pumping air inevitably creates hiss across a broad band of frequencies, which then has to be cancelled out through costly attenuation.

Traditionally, this comprises sound-absorbent splitters aligned downstream of the fan, and usually in a separate section. While these absorb noise quite well in the upper frequencies, lower frequencies are more tricky to attenuate, being easily transmitted and of most distraction to the human ear.

While the percentage cost of passive attenuation is pretty cheap compared with that of fans and motors, there can be many hidden costs, such as the overall size of an ahu, or the costs of providing plantroom space for a splitter section.

An alternative technology which has been extensively researched in recent years is that of active noise control<sup>1,2</sup>. While the technology was found to be viable, research suggested that the costs were high relative to the passive approach of sound-deadening panels and splitters.

Ventilation equipment manufacturer ABB Ventilation

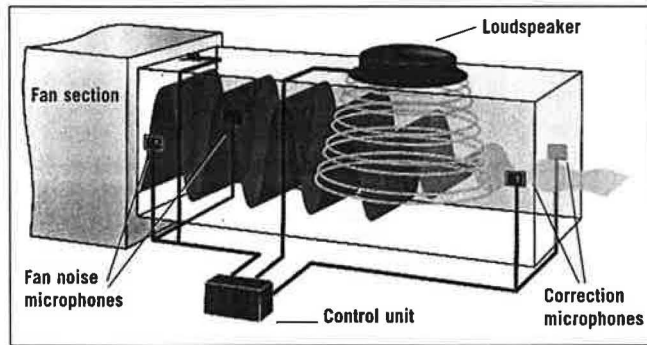
Products believes otherwise, concluding that the extra cost of active noise control is amply compensated by reductions in the size of ahus, and improvements in sound performance.

As a result, ABB is poised to launch a range of EC 2000 ahus which forsake acoustic splitters for microphones, speakers and an on-board amplifier. In technical terms, ABB's Aktipass

ABB will initially be offering Aktipass on its EC 2000 Compact range of ahus, with air volumes from 3-14 m<sup>3</sup> s<sup>-1</sup>.

The company is claiming big advantages for Aktipass. According to development engineer Stellan Åkesson, unwanted sound in the lower frequencies – 63, 125 and 250 Hz – is difficult to attenuate as passive silencers struggle to cope with noise in that

waveband. "With the Aktipass system," claims Åkesson, "we can reduce sound levels by 9-10 dBA in the frequencies most easily heard by the human ear, all in a duct length of only 1.5 m."

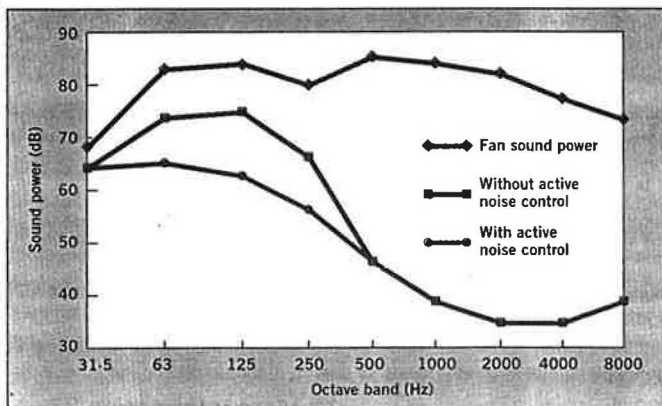


### References

- <sup>1</sup>Brister A, "The sound of silence", *Building Services Journal*, 7/93.
- <sup>2</sup>Wilmott R, "Sound solutions", *Building Services Journal*, 5/96.

**RIGHT, FIGURE 1:** Simplified arrangement of the Aktipass active noise control system. Horizontally-arranged splitters can also be added inside the active noise section, helping to dampen any noise even further.

**BELOW, FIGURE 2:** ABB's tests suggest that the attenuation provided by the active noise control alone is in the order of 10 dBA in the 125 Hz band. Adding splitters would improve on this performance.



noise control system is simplicity itself (figure 1). Strategically positioned microphones are used to measure the noise at the fan outlet. A microprocessor then reverses the noise signal and injects anti-noise downstream of the fan. This reduces the sound power level and cancels out the fan noise.

Finally, a bank of microphones tests the resulting sound level, correcting the amplified signal to obtain the desired sound.

All this is then incorporated within the main body of the ahu, obviating the need for a splitter section, although ABB will be offering hybrid ahus combining both active noise control and passive attenuation.

ABB has reached an "exclusive agreement" with the American company Digisonix to provide the amplification and associated active noise kit. Development work has been carried out by ABB to develop a range of splitters which fine-tune the attenuation provided by the active noise system.

Åkesson claims this can halve the length of a 3 m ahu, very useful for projects where plantroom space is at a premium, or where an ahu has to be close to the occupied zone, for example in clubs/dance halls.

Obviously, reducing the sound attenuation will also mean a slight improvement in pressure drop, possibly by around 10%, but this largely depends on the size of the ahu.

The solid-state circuitry should be reliable in operation, although introducing delicate electronic components into the relatively unsophisticated world of air handling does raise issues of maintenance and component longevity.

ABB stresses that active noise control provides a level of acoustic performance otherwise unattainable by more conventional means.

While Aktipass may well add 10-15% to the cost of an ahu, this very much depends on the application. In some cases the spatial requirements of passive silencing may be more expensive.