

Strong economics
and energy savings
boost market

By Bruce Nagy

FAVOURABLE WINDS FOR

air curtains



In the summer, an air curtain keeps the conditioned air in and the heat out when customers enter this Oregon grocery store.

Favourable winds are blowing toward air curtain technologies. For example their energy saving ability is being recognized more than ever within building codes, although the process is moving slowly.

Air curtains are basically fans in a box with a linear nozzle mounted above big warehouse shipping doors, front doors for retailers, institutions, and drive-thru windows. They blow a stream of heated or unheated air down in front of the opening, creating an insulating effect between the outside air mass and the air inside.

Quick payback

In general, air curtains offer strong economics that should make them easy to sell. In most cases they pay for themselves through energy savings in less than two years. “The whole point of an air curtain is to save energy. They need to be sized right, to maintain separation between the air spaces,” says Sarah Grandinetti, application engineer at Aqua Air Systems in Edmonton.

“Creating a proper seal is all about the right velocity and volume for the situation...or, for cold storage you might consider heat. Heated curtains can help prevent energy from moving across the barrier.”

Manufacturers state that air curtains are 70 to 80 percent efficient at separating two environments. They also keep out car fumes, insects, dust and humidity and they are slowly replacing the plastic curtains between warehouse areas due, in part, to safety concerns.

Vestibule alternative

ANSI/AMCA tested air curtains are now being seen as acceptable alternatives to vestibules by both the International Energy Conservation Code and the International Green Construction Code. This could

mean significant construction savings for owners.

Like everything, air curtains are becoming more sophisticated, but they are basically electric fans requiring something around 220-amp three-phase power and should be easy to install. Still, the experts have some stories about installers that have really ‘blown it.’

“In one case they installed the curtain inside the building three feet from the warehouse door it was

“Still, the experts have some stories about installers that have really ‘blown it.’”

supposed to be blocking,” says Michael Coscarelli, national sales manager for Berner International in New Castle, Pennsylvania. “They asked me why it wasn’t saving on heating and cooling, and they were serious!”

Precise installation required

“If they’re installed correctly, air curtains don’t actually blow straight down,” reported Leon Wasser, president of Wasser Resources of Toronto. “They’re designed to angle the air stream by five degrees towards the outside so they can resist the wind. So if they’re installed backwards, they blow slightly inward and the wind comes in around the sides of the curtain.” He explains that efficiency is about being precise. “Bigger is not better with air curtains.”

“You want to get them as close to the top of the door

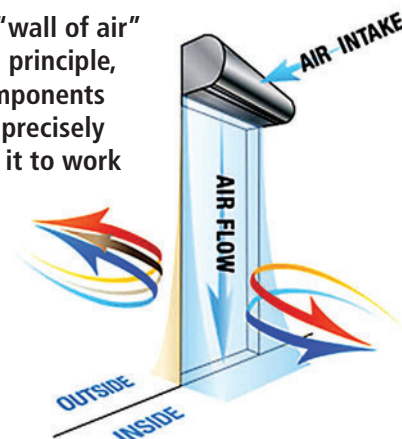
as possible; but in some projects they are recessed into the ceiling,” says Berner sales manager (northeast) Steve Benes. “In that case, they need to be sized according to the height from the floor, not for the size of the opening.”

He despairs that this kind of mistake happens often and describes other sizing errors. “Right now I’m replacing some curtains because the manufacturer exaggerated the CFM that would be pumped out by a ½ hp motor. It’s important to choose products that are ANSI/AMCA-certified.”

“In the last few years a lot of building owners are paying more attention to neutralizing pressures and avoiding outside air being pulled in,” reported Alex Ivanov, account manager for Heat Saving Systems, also in Toronto. “In some restaurants big range hoods in the kitchen are drawing air out of the building and if they don’t have decent make-up air units, that has to be considered.”

The most sophisticated air curtains are used for pedestrian entrances to retail establishments and institutions. Controls turn fans on when the door slides

Building a “wall of air” is simple in principle, but the components have to be precisely located for it to work effectively.





Sealing large overhead shipping doors that are constantly opening and closing is one of the key roles for air curtains.

open, but because it may be opening and closing five times every minute, they use a shut-off delay to protect the motor from frenetic cycling.

There are numerous models for different conditions; some that work with hydronic heating systems, some with special heating roles, VRFs, and designs with beautiful architectural finishes. "We have an HLS model for hazardous locations," says Benes. "We installed it in a project where they were using compressed natural gas because it has spark-proof construction and explosion-proof motors."

Saving energy and retail space

The vestibule versus air curtain question already has a case study in Oregon where an eight-store organic grocery chain called Market of Choice has installed air curtains to save energy, save space and keep flying insects at bay. They are activated by a limit switch, triggered when the door opens, and deactivated on a five-second delay. The units draw interior air from inside the store and discharge it through adjustable (+/- 20 degree) linear nozzles. Velocities range from 1,000 to 3,000 ft/min. Store managers have been trained by the electrical contractor to clean reusable filters and adjust the 10-speed fan for various weather conditions.

Studies that led to the vestibule exception in building codes used computational fluid dynamics to establish that an air curtain/auto-door combination is 60 percent more effective for environmental separation than a conventional two-door vestibule. Vestibules also cost up to 75 percent more to construct than air curtains, and they can subtract hundreds of square feet of valuable retail floor space.

Multiple roles

Some air curtains are installed in addition to a vestibule. Some are designed to change fan speed, switching roles and becoming part of the heating system when the door is closed. Such is the case with the new medical centre at the University of Pittsburgh. Medical buildings are notoriously difficult to design for energy savings because they generally have numerous doors, high traffic, and everyone is in a



In a Belleville, Ont. shopping mall, air curtains were hung on rods to put them precisely in the right position.

hurry; making vestibules less effective.

The building's designers were seeking LEED Silver designation. They invested in high efficiency boilers with variable frequency drives, chillers, rooftop DX systems, special glass, passive solar design, and so on. But a lot of this might have been wasted with 11 different entranceways continuously opening and closing. So they integrated air curtains and vestibules into the HVAC plan. The energy saving has been estimated at 18 percent, or up to \$500,000 on utility bills in some years.

Expanding market

The biggest and fastest growing opportunity for air curtains is the retail market including small shops, restaurants, banks, grocery stores, auto dealerships and drive-through windows. Experts say there is a huge undeveloped market in North American drive-throughs in particular. The biggest ticket installations are usually shipping doors because the openings are much larger, requiring more expensive models. Shipping door curtains are usually unheated because fewer employees and customers work near them or have comfort expectations in those areas.

Wasser describes a significant installation inside the vestibule of a Belleville, Ont. shopping mall entrance. Because of the architectural design, units had to be suspended from rods mounted on a high ceiling to be both aesthetically appealing and effective.

Whatever the challenges of a particular project, it shouldn't be that difficult to do a bit of homework on air curtains, size them right, install them right, take some pictures and capitalize on an expanding market. +



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