

Saving Healthcare Construction and Operating Costs with Berner Air Curtains

By Stephen Benes, Regional Sales Manager, Berner International Corp.

HVAC trends are pointing toward an increasing amount of consulting engineers that specify air curtains for healthcare applications to reduce their clients' operational costs.

However, those specifications are not the common shipping door or foodservice back door air curtain applications to prevent flying insect infiltration. Instead, air curtains have expanded to the front door, emergency room door and even foodservice walk-in cooler doors to reduce energy costs.

The trend toward the front doors is very apparent to Don Peterson, P.E., a principal at consulting engineering firm, Robert G. Burkhardt & Associates, Chicago, which specializes in total HVAC design for healthcare facilities.

Burkhardt, which has specified HVAC for dozens of projects including Central DuPage Hospital, Winfield, Ill., Edward Hospital, Naperville, Ill., and Saint Joseph Hospital, Elgin, Ill., specifies air curtains on almost every new healthcare project now, according to Peterson. Entry vestibules are the main target in 90-percent of the projects because of the high foot traffic. Automatic doors in emergency rooms are also getting air curtain treatments for energy reduction, but also to minimize idling vehicle emission infiltration that's inherent in emergency areas.

The trend toward pedestrian doors is a direct result of increasing energy costs and the air curtain industry's move toward more aesthetic models that either match doorway frames or recess inconspicuously into ceilings with flush-mount designs. The energy saved with an air curtain many times results in paybacks under two years.

How Air Curtains Work

Air curtain technology draws interior air from the facility and discharges it through field-adjustable (+/- 20-degree) linear nozzles that "seal" the doorway with a non-turbulent air stream that meets the floor approximately at the threshold of the door opening. A properly-sized air curtain can contain approximately 70 to 80-percent of that air and return it to the space. Because an air curtain discharges air at velocities generally in the range from 1,000 to 3,000 ft/min., it separates the indoor from the outdoor environment and effectively prevents outside air and flying insect infiltration. The air curtains are typically activated by a limit switch or a smart control that can be programmed for a variety of opening and closing functions, as well as supplemental spot heating from optional on-board electric, steam or hot water coils.



Aesthetic In-Ceiling Mount Designs Drive Front Door Trends

One reason architects and engineers are specifying air curtains for healthcare lobbies, entrances and foyers is the industry's introductions of more aesthetic models.

For example, the in-ceiling mount designs, which can be installed in both suspended T-bar and finished ceiling applications, feature flush-mounted aluminum facings and decorative grilles that can be powder-coated nearly any interior furnishing color. In-ceiling mounts are a contrast to more conventional air curtains that are suspended over doors.

Some in-ceiling mount air curtains can accommodate doorways that have ceilings as high as 16 feet. Widths range from three feet for pedestrian doors to 12-feet for multiple doors.

The technology of In-ceiling mount air curtains has advanced recently as well as aesthetics. State-of-the-art models draw room air, versus older methods of drawing potentially contaminated air from inside the ceiling.

Continued on back.



Saving Energy and Creating Healthy, Comfortable Environments



Walk-In Cooler Air Curtains

Walk-in cooler doors, common to all healthcare facility foodservice operations, also waste energy when opened dozens of times daily, according to the Energy Policy and Conservation Act (EPCA) (Section 312) compliance. The code now mandates the energy-conserving, air infiltration reduction methods of either strip curtains, spring-hinged swinging vinyl doors or other options, such as air curtains for all walk-in coolers manufactured after Jan. 1, 2009.

Air curtains may be the most efficient of the walk-in cooler door options, according to an Arby's franchisee Donoghue & Pivrotto Enterprises Inc., Wexford, Pa., which operates four Arby's stores. The franchisee performed a two-week audited test on a 10 x 12-foot walk-in cooler at its 3,300-square-foot Arby's in Butler, Pa. After outfitting the walk-in cooler entrance with an air curtain, the results showed the refrigeration circuit's compressor ran 1.75-hours less during one week—a 27-percent reduction in compressor run-time and equipment wear-and-tear. The improvement resulted in nearly 100 fewer operating hours per year for an estimated annual savings of \$447 and a 1.6-year payback on a walk-in cooler entrance air curtain.

Healthcare facility operators are continually looking for methods of cutting operational costs. The air curtain is an option with a very short payback of two years or less, in most cases, for reducing energy losses at the doorway.

The main difference between air curtains are manufacturers' specification claims and the actual performance statistics. For example, an engineer might specify a particular discharge cfm, but an overstated specification in a manufacturer's catalog might result in poor performance and ultimately lost energy saving potential. Volume, velocity and uniformity of the air stream are critical factors in an air curtain's effectiveness, therefore it's important that air curtains perform up to manufacturers' specifications. The Air Movement & Control Association (AMCA-International), Arlington Heights, Ill., which is a not-for-profit organization that tests and certifies fans, blowers, air curtains and other air movement devices, created a test standard to assess air curtains and certify their performances. Thus, AMCA Standard 220, "Laboratory Methods of Testing Air Curtain Units for Aerodynamic Performance Rating" is now a test standard that's an American National Standards Institute (ANSI) and ISO standard.

An AMCA rating label should rank as highly with engineers as Underwriters Laboratories, (UL), Northbrook, Ill., or National Sanitation Foundation (NSF), Ann Arbor, Mich., certifications. "We pay close attention to whether an air curtain model is rated by AMCA or not," added Peterson.

A Vestibule Substitute

Air curtains have proven energy efficiency superiority over vestibules, according to the energy study "Air Curtains: A Proven Alternative to Vestibule Design" verified by second-party research/validation consultant, Blue Ridge Numerics, Charlottesville, Va. The study used computational fluid dynamics (CFD) analysis technology to prove that an air curtain/automatic door combination is 60-percent more effective in environmental separation performance than conventional automatic two-door vestibules.

Furthermore, vestibules cost up to 75-percent more in labor/materials than air curtains, and they also consume more valuable floor space, which in today's construction environment can carry costs between \$100 to \$250 per square-foot. While they carry expensive construction costs, vestibules theoretically conserve energy because as one door opens, another closes and prevents a breezeway where heated and cooled air escapes or outdoor environmental elements can infiltrate. Unfortunately, multiple people in the vestibule can defeat the strategy and create a scenario whereas both doors open simultaneously and create a wind tunnel into the facility.

Specifying air curtains as energy-saving, cost-cutting alternatives to vestibules in 3,000-square-foot buildings and larger are blocked by local jurisdictions that have adopted the International Energy Construction Code (IECC), which doesn't yet cite air curtains as vestibule alternatives.

However, the recently-enacted International Green Construction Code (IgCC), which was published earlier this year, now allows air curtains as vestibule substitutes. The IgCC provides an approved overlay of green construction products to the IECC's base code, which is overseen by the International Code Council (ICC), the Washington-based organization responsible for providing minimum safety, sustainability and affordability building codes and standards.