



Industrial Parts Manuf. Installs Air Doors for Energy Efficiency and Gets an IAQ Surprise

"We hit two birds (energy savings and IAQ) with one stone (air curtain technology)," said Michael Coleman, president, Coleman Tool, Union Grove, Wis.

Berner International Corp.

Coleman Tools

Union Grove, Wis.—Coleman Tool & Mfg. Co. originally specified air curtains to save monthly winter heating costs, but later discovered a dual purpose of filtering welding process smoke to significantly improve employee indoor air quality (IAQ).

Industrial plants have used air curtains above open doorways for decades to save energy by separating interior and exterior environments. The welding, machining and metal fabrication company that specializes in replacement parts for waste disposal vehicles, followed the trend and specified air curtains for its new 60,000-square-foot plant, built by design/build company, Design 2 Construct (D2C), Jackson, Wis. An in-house mechanical engineering team, which performed much of the building's mechanical engineering requirements with D2C, didn't hesitate to specify air curtains for two 16 x 16-foot and one 12 x 12-foot overhead doors, because of the technology's renowned energy savings.

Coleman Tool now relies on one CFA and two CFC model air curtains, manufactured by Berner International, New Castle, Pa., to retain heat while the doors are open at a significant energy savings. Consequently, the building now maintains a 60°F plant wintertime temperature generated purely from the waste heat of its industrial welding process production.

This is contrary to its former building that didn't have air curtains, used supplemental heaters, kept the shipping doors open more frequently, and used exhaust fans to expel welding smoke. Unfortunately wintertime heat was exhausted, too. However, the new building now incurs no supplemental winter heating costs, significantly reduces heat loss during open door periods, and re-circulates heated air through the air curtains, all which contribute to the company's ongoing green and environmental-consciousness mission, according to Paul Bugner, head of maintenance.

The air curtains, which are activated manually or with a limit switch triggered by a door opening, help maintain the temperature because they eliminate outdoor air infiltration. Air curtain technology draws interior air from the facility and discharges it through field-adjustable (+/-20 degree) linear nozzles to produce a non-turbulent air stream that meets the floor approximately at the threshold of the door opening. Temperature differences and prevailing wind conditions cause the majority of air exchange and resulting energy loss across the opening. An air curtain can contain approximately 70 to 80 percent of that air and return it to the space. Because the air curtain discharges at velocities generally in the range from 3,000 to 6,500 ft/min., the strong airstream shield prevents outside air and even insect infiltration.

To continually protect the door opening from these exterior forces, Berner factory-engineers these air curtain for size, air volume flow rate, airstream velocity and discharge nozzle uniformity, which is critical to air curtain performance. These aerodynamic performances are certified by the Air Movement & Control Association (AMCA) International, an Arlington Heights, Ill.-based not-for-profit association that assures accuracy in the specification claims of air curtains, fans, blowers and other air movement devices.

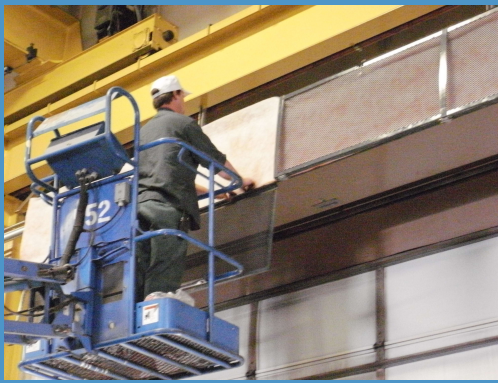
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Saving Energy and Creating Healthy, Comfortable Environments





Coleman Tool's welding smoke is eliminated by air curtains outfitted with quick-access, MERV 8 air filters designed by maintenance staff.

Coleman Tool & Manufacturing's new plant use air curtains to separate the interior and exterior atmospheres. It has found it has no supplemental winter heating costs, with significantly less heat loss during open door periods. And, the heated air is re-circulated through the air curtains, which contributes to the company's environmental management efforts.



Filtering Welding Smoke

While Coleman Tool was racking up impressive energy savings figures with air curtains, the lack of air infiltration and cross-ventilation during the winter had affected IAQ. To control smoke and other airborne contaminants generated by Coleman Tools' 10 Miller Electric Mfg. Co., Appleton, Wis., welding bays and four igm Robotic Systems, Menomonee Falls, Wis., welding stations, mechanical engineers specified 14 Industrial Maid, Cortland, Neb., industrial air filter walls that surround the 15,000-square-foot welding area.

Despite the efficacy of the air cleaners, an estimated 20-percent of the smoke still rose up and out of the welding area creating a haze throughout the plant. Energy savings were important, but not at the expense of IAQ, according to Coleman.

One expensive solution proposed adding tens of thousands of dollars worth of rooftop make-up air equipment to re-circulate heated air. Instead, Bugner theorized that the air curtains might serve a dual duty as air cleaners as well as energy savers. The high 16-foot height above the doorways was a strategic position to help the air curtains draw in the lofty haze.

Some air curtain manufacturers offer options for conventional filtration add-ons, however Bugner felt heavy industrial welding smoke would need a filter holder designed for quick and frequent replacements to keep labor expenses in check. Also, most conventional fiber filters carry a MERV (Minimum Efficiency Reporting Value) rating of 1 to 6, whereas welding smoke and particulates would need at least a MERV 8 filter--the same rating as the filters used in the welding area air cleaners. "We designed a filter holder we could manufacture ourselves, required only 10 minutes or less to replace, was aesthetic, didn't affect the air curtain's airflow and would use inexpensive off-the-shelf filters," said Coleman, who has since applied for patents on the filter design to market it to industrial air curtain users needing heavy duty filtration.

Fine Tuning the Filtration

Bugner experimented with different combinations of inexpensive filter media and filter holder styles to further drive down maintenance costs. Since a 24 x 24-inch filter is a standard off-the-shelf size, the steel filter holder was fabricated to allow eight pleated fiber filters for the two 16-foot-wide air curtains (six for the 12-foot-wide air curtain) to be slid into either end in 10 minutes or less. The filter holder's metal fabrication, a Coleman Tool specialty, was designed with light weight and rigidity, but also featured an attractive safety grille that also prevented larger items such as hands or other accidental contacts from entering the filter portion.

Bugner also experimented with less expensive filter roll material that could be cut to a desired length. This method required a filter holder with a hinged door for easy access, however it was later decided that aesthetics suffered without the 2x2-foot pleated filter framing to hold the material neatly in place.

The IAQ results have been significant. The haze is gone, the production floor's air smells fresh, and the plant's chronic asthma sufferers notice significant breathing improvements, according to Bugner

Coleman executives now believe all industrial buildings should be outfitted with air curtains for energy-saving environmental separation in addition to IAQ filtering reasons. "In our case we had to have air curtains to save energy, so the fact they also boost IAQ is a bonus that carries virtually little additional cost," Bugner said. "Anyone that thinks they have a clean environment should put up an air curtain with a filter. They'll find out the air isn't as clean as they thought."