When a High-Speed Door Is More Energy Efficient

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As traffic travels through a facility, industrial doors open and expensive conditioned air pours out. Energy has just been wasted. How do you maintain an energy-efficient environment and still enable efficient traffic flow?

A recently completed DASMA study, presented at Expo 2014 in April, found that if a doorway is used frequently, a high-speed door not only delivers both but can do a better job of saving energy.

New Rules

On the basis of this new research, the 2015 International Energy Conservation Code (IECC) will recognize the contribution of high-speed doors to energy conservation. The addition of rapid-operating doors offers a new way to achieve significant energy savings while providing better traffic flow.

The industry has always acknowledged that high-speed doors could not meet the codes' prescriptive U-factor requirements. Because of the curtain's relatively thin fabric, vinyl, or rubber composition, door U-factors approached 1.20.

However, it turns out that air leakage and U-factor are not enough to evaluate doors for energy performance. According to the research, when door usage and door speed are taken into consideration, U-factors become less important.

Dynamic Doors

Prior to this research, building codes viewed doors as closed or static. Now doors are regarded as dynamic parts of the building. High-speed doors, besides quickly letting traffic in and out of the building, contribute to the thermal efficiency of a building through dynamic thermal performance characteristics when the door is frequently opened and closed.

The predominant benefit of high-speed doors is their ability to control "air exchange," or the air flowing through a door opening when a door is not fully closed. When taking thermal transmittance (U-factor), air leakage, and door power usage into consideration, air exchange can be the most significant part of the total energy loss for that door.

After nearly two years of research involving third-party lab testing, DASMA developed a method to demonstrate the efficiency of high-speed doors in building envelope energy calculations. The Rytec PredaDoor, a prototypical high-speed fabric door, was the test subject for performance testing and evaluation.

Fifty-Five Cycles Make the Difference

The study showed that high-speed doors become more efficient when cycled 55 or more times per day. The crossover point is illustrated below:

Annualized Energy Consumption Analysis

Door Type		High-Speed	Conventional
Cycles/Day	average	55	55
Door Size	ft. x ft.	8 x 8	8 x 8
Opening Speed	in/sec	32	8
Hold Open Time	sec	10	10
Closing Speed	in/sec	24	8
Air Leakage	cfm/sf	1.3	0.4
U-Factor		1.20	0.25
Assumed Door Operator Horsepower	hp	2	0.5
Energy Consumption - Door Operator	kWh	58	50
Energy Consumption - Air Exchange	kWh	6,109	9,954
Energy Consumption - Air Leakage	kWh	416	126
Energy Consumption - Conduction	kWh	4,443	916
Total Energy Consumption	**kWh**	**11,026**	**11,046**

While 55 is the minimum, high-speed doors are typically specified for applications requiring 75 to 100 cycles per day. Thus, these doors demonstrate superior overall energy efficiency when meeting the demand for high-cycle operation in a building.

ASHRAE 90.1 (regarding non-residential buildings) and ASHRAE 189.1 (regarding sustainability) now recognize the concept of dynamic door operation along with the new regulations pending from the IECC. When a high-speed door is specified for a building, the door should comply with the new performance standard set for high-speed doors.

Therefore, the door manufacturer should be able to supply you with opening and closing speeds, U-factor and air leakage performance values, and the annualized energy performance of the door compared to those of a conventionally operating insulated door. This will be your assurance of a top energy-performing product.

Thanks to building codes being up to speed on high-speed, your customers will be thinking differently about how doors can contribute to sealing up the building envelope. ■