

Use intelligent swing doors to save energy!

Rebeca Homssi

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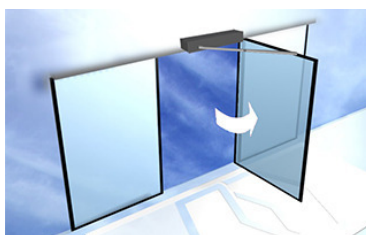


Figure 1: An automatic swing door is shown. The dark grey rectangle over the door is the operator with the motor. When the door opens the cold outdoor air can flow freely into the building.

Every time an automatic swing door opens the cold outdoor air flows into the building. To reduce the infiltration, the door can be controlled to not open more or longer than necessary. This optimization can reduce energy losses with up to 90%.

To battle climate change it is necessary to reduce the carbon dioxide emissions. Buildings, especially space heating, are one of the most significant contributors to the extensive emission. The need for space heating is due to infiltration of cold air from the outdoors. Infiltration can be through materials and gaps but mainly from when the door is standing open. Today, the automatic swing door stands open for a long time to ensure safety for the pedestrians. In some applications, the time the door stands in the open position is about 15 seconds, which results in a temperature drop on over $5^{\circ}C$. The cost for reheating is calculated to

over 0.35 SEK, for such an opening.

In this project, different concepts and methods of how to reduce the length the doors stand open were considered. The main goal was to control the automatic door to act as a manual door, not open too much or for too long. The air leakage for different times the door stood in the open position together with calculations of varying control strategies was made. The concepts with good user experience, high accuracy and safety, and low energy loss were chosen to be presented for the company. Since it takes a healthy person 1 second to pass a door the time the door stands open

could be reduced with over 90%.

Due to a lack in sensor technologies the concepts were divided into three categories: some that could be implemented today, some in a couple of years and some further in the future. The aim was to show that better communication between a smart sensor and a door is necessary to ensure safety. The laws and regulations make it hard to optimize an opening today but as the knowledge about the energy

losses and the use of smart sensors increases the rules can be changed.

To be able to reach the EU directive, that all new buildings must be nearly zero buildings the automatic swing door needs to be controlled to minimize the air infiltration. It can be done by controlling the door to close as soon as possible. When the energy losses from every time the door open become negligible the savings for both planet and wallet will be substantial.