

centor®

Structural Modelling of Deformable Screens for Large Door Openings

Project description:

Centor's Integrated Doors were introduced to the USA and the UK in June and October 2013 resulting in great enthusiasm from architects and homeowners alike. Centor Integrated Doors are the world's first category of patio doors with built-in screens and shades that completely disappear into the doorframe when not needed – enabling homeowners to enjoy indoor/outdoor living, all day, all year round, without having to see drapes and insect screens when they are not needed.

The large area of Centor's Integrated Doors (up to 2.8m high x 9m wide) means that when the built-in screens and shades are deployed they present a large and uninterrupted "sail" area to the outside elements including wind. This means that these screens and shades tend to deform, even in light breezes and in heavier conditions the tabs that hold them in place at discrete locations can fail.

Centor would like to develop mathematical models of the deformation of these (porous and deformable) screens and shades under various wind loadings. The purpose of this exercise is to:

- Provide Centor with quantitative predictions of the conditions under which their current shades and screens may "fail";
- Provide Centor with an algorithm for the optimal size, number and positioning of the anchoring tabs for various materials, subject to physical constraints imposed by the screen/shade rolling mechanism and volume of the return in which the screen is stored. Such an algorithm should take into account the deformable nature of the screen/shade materials;
- Provide Centor with a robust model of the mechanical deformation of their screens and shades that in the future can be integrated into broader CFD simulations accounting for the physical and built environment in which the door is situated.

To assist in the development of accurate mathematical models, Centor will provide manufacturer data on the material components of the screens and shades as well as the data obtained from a program of in-house, physical and environmental testing and measurement.