Imperial College London

David Allgayer

Air and heat movement by revolving doors

Period of Study: 2002-2006

Supervisor: Professor G. R. Hunt

Abstract / Description of Thesis

As revolving doors operate without ever establishing a direct connection between the environments they link and thus preclude continuous airflows from occurring, they are generally accepted as being more energy efficient than other types of doors.

However, studies investigating the air exchanges through revolving doors and their dependence on door geometry and operating parameters have been few. As a result, the air exchanges generated by a revolving door operating under given conditions can not be accurately quantified, and a systematic means for quantifying air transfers could yield potentially significant energy savings. Air exchanges occur by two means: leakages past the seals of the door; air transfers via the bays of the door.

We investigate qualitative and quantitative aspects of air transfers using a small-scale model of a four-bay revolving door set between two compartments of finite size. The density differences originating from temperature differences at full-scale are simulated using fresh-water and salt-solutions in the model.

Measurements of the effects of the revolution rate, temperature difference and room aspect-ratio on the volumes of air transferred by the door and density structure of the rooms are carried out using a dye-attenuation technique.