

Airflow Simulation Solves Cold Air Problem at Bluewater Winter Garden

MECHANICAL ANALYSIS
HVAC

Design Challenge

The original concept for the Winter Garden area at Bluewater was to bring the outside inside, however, cold air from outside caused retailers to complain of draughts. The area provides fast food and restaurant facilities and is housed in a glazed atrium.

It was not intended that the Winter Garden would be used as a primary entrance to access the shopping centre, however the iconic structure of the Winter Garden atrium towers makes it a focal point as people approach by car and the public are drawn to adjacent car parks. It is now handling up to 5,000 person-movements per hour. During the winter months, primarily as a result of the doors being continuously open, cold draughts penetrate deep into the area under certain external ambient weather conditions.

Solution and Benefits

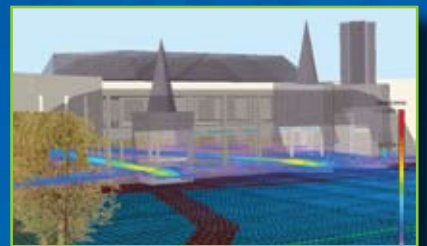
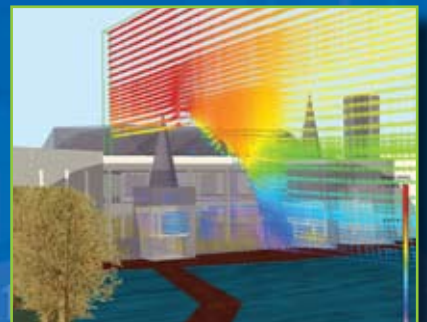
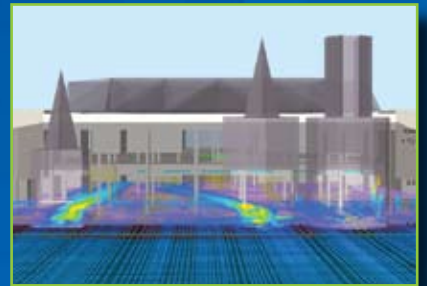
The design group at Elstead working on behalf of Lend Lease Retail Asset Management used the FloVENT Computational Fluid Dynamics (CFD) software to analyze the problem and test viable solutions. An initial computational model was built to ensure that the conditions of air velocity, temperature and pressure experienced on site could be replicated and the causes of the problem could be understood. The computer simulation replicated the actual conditions well and showed the draught effect quite clearly. It showed that the main cause of the draughts was cold air penetrating deep into the space driven by wind pressure at the external building façade.

It is clearly not possible to control wind conditions or change the primary building mass, so the simulations focused on ways to control the airflow and increase local air temperature near the entrance. Various solutions were investigated including over-door air curtains, a low-velocity downflow 'air shower' mounted at high level in the entrance lobby, and strategically placed under-floor heating. Design options were quickly found which gave satisfactory results and improvements in airflow patterns and temperatures.

Customer Testimonial

" The CFD simulations allowed the problem to be rapidly analyzed and understood and enabled viable solutions to be determined before undertaking costly remedial work. CFD is a fast and economical way to predict the performance of heating and ventilation systems, make informed decisions and avoid potentially expensive mistakes. "

Ian Johnson, Engineering Manager
Lend Lease Projects



Copyright © 2008 Mentor Graphics Corp
Mentor Graphics is a registered trademark of Mentor Graphics Corporation.
All other trademarks mentioned in this document are trademarks of their respective owners

Mentor Graphics
Mechanical Analysis Division
81 Bridge Road, Hampton Court
Surrey, KT8 9HH, UK

Tel: +44(0)20 8487 3000
Fax: +44 (0)20 8487 3001
info-mechanical@mentor.com

Mentor Graphics
Mechanical Analysis Division
300 Nickerson Road
Marlborough, MA 01752, USA

Tel: +1 (508) 480 0881
Fax: +1 (508) 480 0882
info-mechanical@mentor.com

Please visit our website at:
www.mentor.com/mechanical

Mentor
Graphics®