Food Refrigeration & Process Engineering Research Centre

THE GRIMSBY INSTITUTE of Further & Higher Education

Computational Fluid Dynamics (CFD)

Background

CFD is a computer-based tool for simulating the behaviour of systems involving fluid flow (such as air flow around a room or liquid flow in a vessel or pipe), together with heat transfer and other related physical processes.

It has been used for many years by the nuclear, aerospace, chemical and automotive industries and in scientific research. Recent advances in computing power mean that the process of creating a CFD model and analysing the results is much less labour-intensive, reducing the costs and timescales. As a result of these factors, CFD is now an established industrial design tool, helping to reduce design timescales and improve processes throughout the engineering world.

CFD provides a cost-effective and accurate method of testing alternative design ideas and gaining knowledge of the likely success of a system before progressing to scale model testing or the final build. Variations on the simulation can be performed relatively quickly, offering the advantage of trying many different scenarios in a short space of time.

How frperc can help

frperc has been using CFD to aid in process and equipment design since 1993. It can enhance the user's understanding of airflows and temperature distributions within any space, such as rooms, buildings or display cabinets, whether the airflows are hot or cold.

Gaining understanding from a computer model can save considerable cost and time that would otherwise have been spent on repeatedly designing and evaluating equipment.

CFD can also help to design equipment or processes that would be very hard to take measurements of or evaluate by any physical means. For example, it is difficult to measure the airflows in refrigerated cabinets due to the space constraints and without the measurement devices affecting the airflows themselves.

frperc have applied CFD techniques with great success in the following areas:

design of refrigerated retail display cabinets

ventilation around supermarket refrigerated aisles

entrainment through cold store entrances

simulating airflows within cold stores for incorporation into cold store models

frperc has successfully used CFD in both long-term research projects as well as short-term industrial consultancy.

If you require an academic partner in a research project or require the use of CFD to solve a problem in your process, please contact us on +44 (0)1472 582400 or email us on frperc@grimsby.ac.uk