**Project:**

ANALYSIS OF ENERGY DISTRIBUTION IN OPEN PLAN COMPARTMENT FIRES

**Keywords:** compartment fires, Regime II, fire dynamics, heat transfer, FDS

**Background and motivation**

A series of large-scale fire experiments was performed for the ‘Real Fires for the Safe Design of Tall Buildings’ project, which purpose was to provide sufficient data that would allow a characterisation of Regime II fire behaviour. These experiments explored different fire modes (fully-developed, spreading, and travelling fires) and different ventilation conditions (steady fully-open, steady partially-open, and variable ventilation). Large amount of instrumentation was used, which consisted of thermocouples (to measure gas-phase temperatures in the compartment), pressure probes (to measure velocities through the opening), Thin Skin Calorimeters (to measure incident radiation onto the walls), and laser devices (to measure light obscuration within the compartment).

Recent work has focused on processing all the data in order to provide an assessment of the energy distributions achieved for different types of fire modes and ventilation conditions. Although this work proved that a conservation of energy is generally obtained for some scenarios, a significant divergence was obtained for others. This disagreement could be caused by a series of factors that need to be further investigated, e.g. the uncertainty in the flow calculation through openings.

Additionally, several authors have previously modelled these compartments using the Fire Dynamics Simulator, achieving a relatively accurate prediction of gas-phase temperatures.

**Research objectives**

This project will focus on the following aspects:

1. a review of previous work on the Edinburgh Tall Buildings Fire Tests regarding data analysis and fire modelling;
2. modelling of specific scenarios to assess the uncertainty in the energy distribution analysis; and
3. an analysis of temporal and spatial energy distribution ratios.

**Recommended literature**

