CASE STUDY

University College London, School of Slavonic and East European Studies

Introduction

University College London, School of Slavonic and East European Studies (UCL SSEES) is an academic building in central London designed by Short and Associates. Warrington Fire were commissioned to prepare a fire strategy for the building.

At the time of preparation of this report the building is in construction and is due to be complete at the end of 2005.

Figure 1 – Artists impression of front elevation of new UCL SSEES buldings - Copyright Short and Associates, Architects

This report has been prepared to detail the fire engineering strategy that was developed for the building.

The building was designed to fit within a site bounded by two existing buildings used by the University. The building consists of the following areas:

- Academic offices and teaching facilities on the upper levels
- Library on the lower levels and basement
- Service/access road to the loading bay of the adjacent building at ground floor
- Atrium linking all floors

The building was designed to be naturally ventilated in line with targets for reducing CO_2 emissions and life cycle costs. This resulted in a number of large shafts rising through the building.

The building will be used for academic research and as a student resource centre.

The main aspects of the fire strategy were:

- Means of escape analysis for the new building and its effect on the surrounding buildings
- CFD smoke flow analysis for the basement area and large ventilation well at the front of the building
- In-depth external fire spread analysis

The fire strategy was developed in close liaison with the Building Control authority, the fire brigade and all members of the design team. There was also input from the proposed insurers of the building, in particular due to the collection of rare books which are to be stored in the library area of the building.

Overall Strategy

A fire engineered approach was taken to the design of the building. This was based on an overall assessment of the fire risks both to the occupants of the building and to the books and other materials to be stored in the library, and close liaison with the designers and client to ensure that the design achieved the objectives of the client, maintained the architectural concept and minimized the cost.

The fire strategy for the new building also had to take account of the effect of the existing surrounding buildings. The escape strategy for the new building had to make provision for the occupants of the two existing building who had previously had access to escape routes via the site of the new building. The client was also concerned about the risk of fire spread from one of the adjacent buildings which was considered to be a high risk due to some of the activities undertaken. There was also a desire to maintain free air paths through the building to allow the natural ventilation system to maintain comfortable environmental conditions.

Means of Escape

The means of escape routes were generally designed to meet the recommendations of the Approved Document B. However, the UCL SSEES building did not have any stairs of its own. All the upper levels are cross linked to the adjacent buildings and the stairs are shared between the three buildings.

Each building is treated separately and only evacuated if a fire is detected in that building, unless the fire service feel the need for a wider evacuation. The building is located on a sloping site, therefore the ground floors and basement both have level egress directly to outside.

Structural Fire Resistance

The building was designed with a reinforced concrete frame to provide thermal mass to the building. It was therefore not felt to be advantageous to carry out a detailed structural fire engineering analysis. However the building was on a sloping site which has been artificially dug out to suit the needs of the existing buildings. It was not considered appropriate to measure the height of the building from the artificially lowered level. Therefore the building was designed for 60 minutes fire resistance rather than the 90 minutes that would be required had the height been measured from the lowest ground level.

Smoke Flow CFD Analysis

There were two main issues relating to smoke flow:

a) Means of escape from the upper levels given the air paths through the building

b) Fire brigade smoke ventilation (particularly from the Basement level) to facilitate fire fighting and search and rescue operations.

It was agreed that a CFD smoke flow analysis should be carried out in order to solve these issues.

A specialist CFD company, Simulation Technologies was chosen to carry out the modeling works. This modeling exercise was conducted in conjunction with Warrington Fire in order that the model accurately reflected the fire safety strategy.

Warrington Fire developed the proposed fire scenarios which were selected to be the most onerous for smoke build-up within the space. These were agreed with all relevant parties (especially Building Control and the fire brigade) and then modeled by Simulation Technologies.

The results of the analysis showed that there would be more than sufficient time for all occupants of the building to escape before untenable conditions occurred.

The analysis also showed that there was more than sufficient smoke ventilation for the fire brigade.

The ground floor of the atrium was glazed to allow light into the basement area. The CFD model was also used to examine the effect on the smoke movement around the building in the event of the possible failure of the glazed element of the floor.

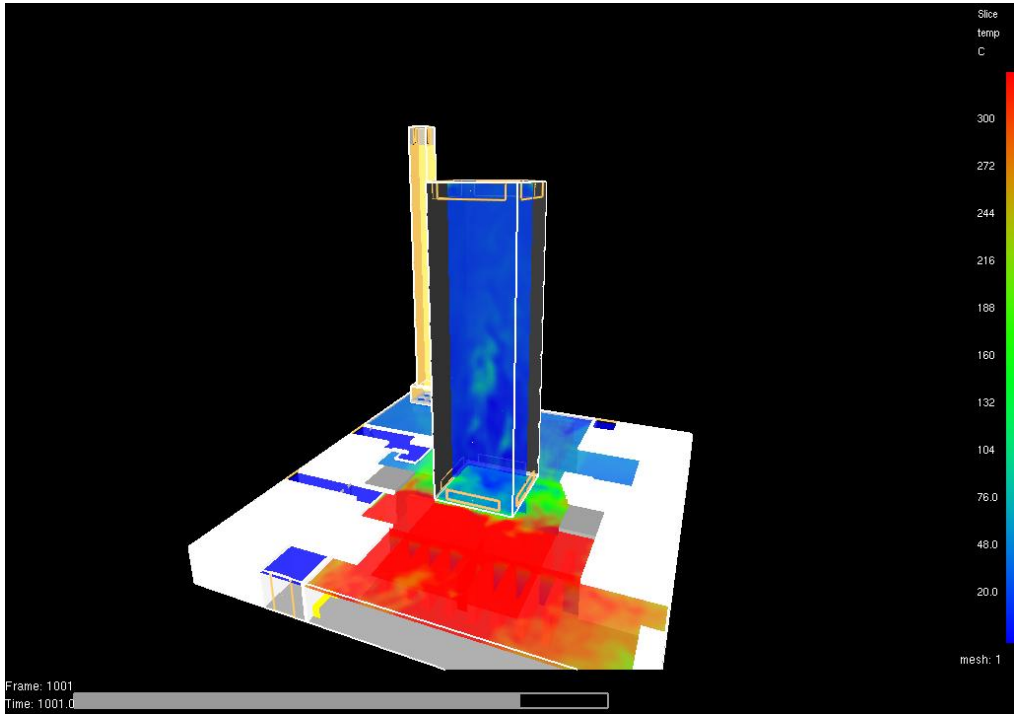

Figure 2 – Fire located at basement level, 11 minutes after ignition.

Achievements of fire engineering approach

The fire engineering strategy that was developed for the building was considered by all parties to be highly successful. It ensured that the architectural concept could be achieved while ensuring that the design was as safe and cost effective as possible.

By working closely with the team and having regular liaison with Building Control and the fire brigade, the design was developed and implemented efficiently.

The main achievements of the fire engineering approach were:

- The architectural design was unusual and was not achievable by the alternative 'code compliant' approach.
- The lack of compartmentation between the basement levels and the upper levels within the building was permitted.
- The natural ventilation system designed for environmental control was shown to be sufficient to provide the smoke venting needs for the basement and upper levels.

Design team

Client	:	University College London
Architect	:	Short and Associates
Project Managers		Tuner and Townsend
Structural engineer	:	Martin Stockley Associates
Services engineer	:	EDP
CFD specialist	:	Simulation Technologies
Building Control	:	London Borough of Camden
Fire authority	:	London Fire and Emergency Planning Authority