



Theatre Flower Lane London, UK

Introduction

The community hall of the Flower Lane building in London, United Kingdom, is located in the basement and will be used as a theatre. People should be able to evacuate safely in case of fire, hence the room is foreseen with a smoke and heat ventilation system.

On request of designer the design of the smoke and heat ventilation system is validated by means of Computational Fluid Dynamics (CFD) simulations. The ventilation system should provide tenable conditions during the evacuation process. The simulation provides insight in the visibility, temperature and incoming radiation flux inside the community hall for a period of 360 s.

The fire ignites in the middle of the right front row of seats. The simulation does not account for the smouldering phase but starts when the fire enters the growth phase. This is a common and conservative approach.

A medium t-squared growing fire is applied for the growth phase, the time to 1 MW is 300 s. The heat release rate per unit area is 250 kW/m². An average heat of combustion of 25 MJ/kg is applied. The mass optical density is 300 m²/kg, corresponding to general building contents as per PD7974-1 (1).

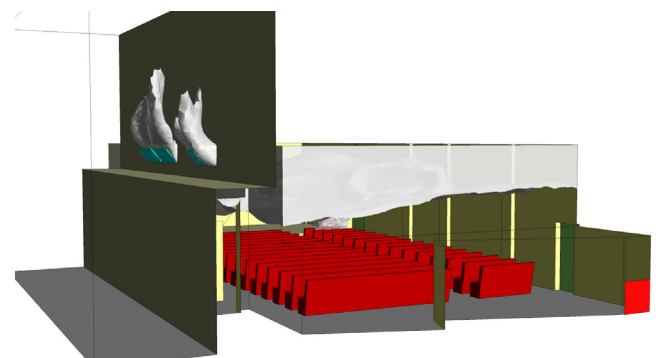
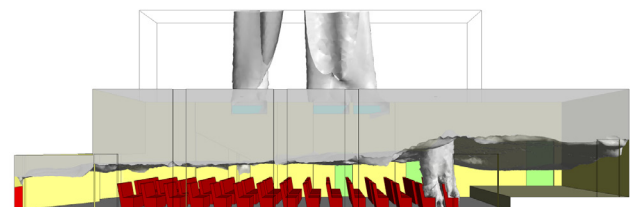
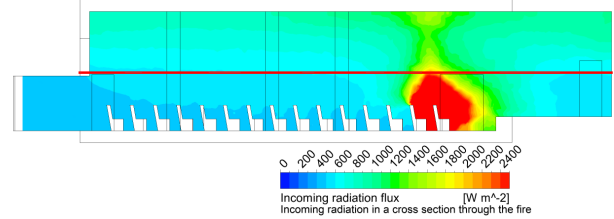
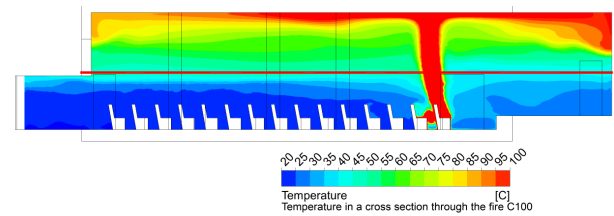
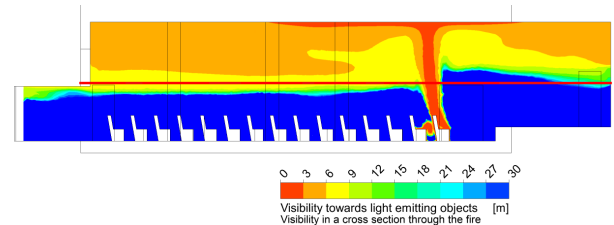
The smoke detectors in the room are modelled according the guidelines in the SFPE handbook. The automatic smoke vents will be opened in the simulation upon detection as calculated in the CFD simulation.

Results

A movie of the smoke propagation in time is published at our youtube channel together with other interesting CFD results:

<https://www.youtube.com/user/ONESimulations>

Based on the CFD results the fire brigade was able to approve the proposed ventilation system.



Several simulation results at 240 s after start of the simulation