

# **Ehab Zalok**

Thesis

Design Fires for Commercial Premises

Abstract

The research explores the potential for identifying design fires for commercial premises. A survey of 168 commercial stores that included clothing stores, fast food outlets, restaurants, shoe stores, bookstores, etc. was conducted in Ottawa and Gatineau to determine fire loads and type of combustibles in commercial premises. Statistical data from the literature were analyzed to determine the frequency of fires, ignition sources, and locations relevant to these premises. The data gathered during the survey along with the statistical information were used to develop fuel packages for these premises, to be tested in medium- and full-scale fire tests. The objective of these tests was to determine the fire characteristics for the selected fuel packages, such as heat release rate (HRR) and production rates of toxic gases. Based on the experimental results, input data files for the computational model, Fire Dynamics Simulator (FDS), were developed to simulate the burning characteristics of the fuel packages observed in the experiments. Comparisons between FDS predictions and experimental data of HRR, carbon monoxide, and carbon dioxide indicated that FDS was able to predict the HRR, temperature profile in the burn room, and the total production of CO and CO<sub>2</sub>. The outcome of this research includes the following: (1) data on fire loads and relative contributions of different combustibles in commercial premises; (2) definition of seven fuel packages and their burning characteristics representing commercial premises; and (3) representation of seven fuel packages to be used in FDS to simulate fires in commercial premises.

Degree

Ph.D.

Completion

2006

Supervisor

Hadjisophocleous