

Weerawuth Hongthong 2014: A Numerical Simulation of Atrium Smoke Ventilation in the New Building of Faculty of Management and Tourism Burapha University at Chon Buri Province. Master of Engineering (Fire Protection Engineering), Major Field: Fire Protection Engineering, Faculty of Engineering. Thesis Advisor: Associate Professor Surachai Radagan, Ph.D. 195 pages.

This thesis presents a numerical simulation of atrium smoke ventilation in the new building of the Faculty of Management and Tourism, Burapha University, Chon Buri province, by using Fire Dynamics Simulator (FDS). The simulation was performed for 3 fire sizes: 2.2 MW, 7.1 MW, and 14.2 MW. The fire was placed on the first floor at the center of the atrium. The simulation was divided into 24 sub cases for 6 major cases: 1. No smoke exhaust system; 2. Mechanical smoke exhaust fan without smoke reservoir; 3. Suitable mechanical smoke exhaust fan flow rate for cases of exhaust system with smoke reservoir; 4. Mechanical smoke exhaust fan with smoke reservoir and closed windows; 5. Mechanical smoke exhaust fan with smoke reservoir and smoke curtain; 6. Mechanical smoke exhaust fan with smoke reservoir, smoke curtain and closed windows.

The numerical results show that: Firstly, it is found that the installation of smoke ventilation is not required for every size of simulated fire regarding the danger from carbon monoxide, according to NFPA 130, 2007 edition. Next, temperature in the corridor to fire exit on every floor: it is found that, firstly, For no smoke exhaust system, it is only with 2.2 MW fire where the average temperature in the corridor is still below 49°C, which is a safe temperature for occupants according to appendix B of NFPA 130, 2007 edition. Secondly, a mechanical smoke exhaust system is required for buildings with 7.1 MW fires, to encourage the average temperature in the corridor to be below 49°C. Lastly, both a mechanical smoke exhaust system and a smoke reservoir are required in buildings with a 14.2 MW fire to achieve a safe temperature below 49°C in the corridor. A smoke curtain is still required to be installed from the second floor to the sixth floor in order to prevent the spread of smoke.

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Thesis Advisor's signature