

Bhumesh Hiriwattanawong 2009: The Simulation of Fire Dynamics and Evacuation: A Case Study in Kindergarten. Master of Engineering (Safety Engineering), Major Field: Safety Engineering, Interdisciplinary Graduate Program. Thesis Advisor: Associate Professor Montri Pirunkaset, M.E. 173 pages.

In order to study the fire dynamics and evacuation in kindergarten, fire dynamics with evacuation option (FDS+Evac) played a major role to analyze evacuation time and behaviors under the building configuration. Two types of model simulation have been designed with six case studies. The first type is the classroom with air-conditioner and closed windows. The second type is the classroom with open windows and without air-conditioner.

The first case of type 1 was modeled to evacuate all 384 people in the building with two final exits, the second case was modeled to evacuate all 228 people in the building with two final exits in accordance with the calculation of the density per area of each floor by the NFPA 101 standard, and the third case was modeled to evacuate all 384 people in the building with two final exits and a left side escape stairs of the building. In the type 2, the first case was modeled to evacuate all 384 people in the building with two final exits, the second case was modeled to evacuate 228 the people in the building with two final exits in accordance with the calculation the density per area of each floor by the NFPA 101 standard, and the third case was modeled to evacuate all 384 people in the building with two final exits and a left side escape stairs of the building. The announcement of Ministry of Interior stated that the escape from the working area to the final exits must be completed no more than 5 minutes, the results of these simulated models were to be compared. Accordingly, the first case of simulation in type 1 took 397 seconds which was beyond the law's obligation while the second and the third simulations took 287 and 281 seconds, respectively in accordance with the law's regulation. In the type 2, the first case of simulation took 390 seconds which was beyond the law's obligation while the second and the third simulations took 263 and 266 seconds, respectively in accordance with the law's regulation. From simulation, both of two types in the model results that the smoke influences on the evacuation behavior. The quantities of smoke limit the vision. So, the movement is slowdown. The second type of open window classroom used less time to evacuate. From the results of evacuated behavior, it was found that these simulations lead to develop the proper method of evacuation and get more efficiency.

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Thesis Advisor's signature

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