

KwanchanokJojant 2014: An Application of Fire Dynamic Simulation with Evacuation for Performance Analysis on Extra Large Building.  
Master of Engineering (Safety Engineering), Major Field:  
Safety Engineering, Faculty of Engineering. Thesis Advisor:  
Associate Professor SereeSvaesaranee,D.Eng. 80pages.

A first simulation was carried for a larger part of the building( production area) where there are 350 people working to simulate the effect smoke travel/ reaction on heat release rate at  $500 \text{ kw/m}^2$  after 4 minutes. This intended to demonstrate the effect of smoke travel to educate the occupant on the need for timely evacuation.

A second simulation. This thesis focuses on the study of a safe evacuation time at the 1<sup>st</sup> floor, 2<sup>nd</sup> floor and 3<sup>rd</sup> floor of a large building in Samutprakarn Province, using the Fire Dynamic Simulation Program, FDS 5.2.0 and Smoke View 5.2.2. The study includes three component namely the fire location, the number of evacuees and width of the exit door. The maximum capacity of the people in all 3 floors were 673, with 163 on the 1<sup>st</sup> floor, 208 on the 2<sup>nd</sup> floor and 302 on the 3<sup>rd</sup> floor. The source of the fire occurred at the 3rd floor and after simulation, it was concluded that about 3.71 % of the people were unable to evacuate from the building within the 5 minutes time frame(Thai Law).

NFPA standard requires safe evacuation time of within 3 mins from any part of the building to a place of safety. Therefore this simulation conclude that this will not meet this standard. It was determine that an additional width of 50 cm can substantially reduce the time required to evacuate from the building and therefore enhance the safety of the occupants. The researcher also conclude that by re-designing the width of the exit by additional 50cm, it can reduce the evacuation time by 30 second. This thesis also found that the designed of exit route also contribute to the evacuation time(i.e) time taken to travel from any point in the building to the muster point) not able to meet the 5 minutes time frame as per Thai Law .

In this simulation, the density of the smoke were distributed and travel to all of the area within 301 seconds(approx5minutes). With reference to the Thai Law of 5 minutes evacuation time, this was found to be not acceptable or adequate. Evacuation from the building must be accomplished with 3.7 mins, otherwise the smoke will obstruct the orderly evacuation of the people due to poor visibility and loss of control(panic). This simulation will benefit in educating the occupant on the need to meet the recommend safe evacuation time of not more than 3.7 minutes.

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