

# 大空間煙控模擬與全尺寸燃燒驗證之比較研究-以高雄市現代化體育館為案例

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## 摘要

Due to the material, the building facility and the related construction technology keep in progress along with time; buildings may show with different patterns and even more complicated types than before. It results in many special construction spaces increasing, such as the high-rise buildings, high ceiling indoor space design, the large-scale underground shopping malls (for example underground subway stations), high tech workshop or large-scale atrium stadium.

However for the fire safety standard required for the above special buildings, the traditional specification laws and regulations (prescriptive-based codes) has used insufficiently gradually, instead has limited the architectural design development, therefore the technology and principle based on science foundation are used to validate the fire safety performance of the above buildings. It namely has been implementing the performance type standard for the present (performance-based codes). The performance type laws' and regulations' essential target, is in guaranteed that the building interior personal security under specified conditions, hoped the designer forms in one's mind the degree-of-freedom can fully display, simultaneously can also let the constructed resources achieve the best utilization, finally can also overcome that the present part of special constructions not able to be suitable for the present laws and regulations situations.

At present, if the building carries on the performance design and seeks the fire safe validation regarding the fire protection, it shall follow the handbook "The Building Fire Protection and Evacuation Performance Evaluation Manual" to carry on the appraisal. The main criteria and its main purpose lies, when the fire occurs the internal all personnel shall

evacuate from the fire site. Therefore, it has to compare the time need for all occupants leave fire site, whether to be smaller than the time of smoke level drops highly affects the personnel evacuation. However some kinds of constructions are unable to use the “The Building Fire Protection and Evacuation Performance Evaluation Manual” to do the evaluation, therefore, some special constructions may adopt the full-scale experiment or by the FDS computer simulation software to evaluate the smoke descending time.

The actual full-scale experiment may unfold, record the real fire situation and the smoke level drop condition clearly, but its consumption's resources as well as the cost are high. Also, the reality does not conform to the environmental protection and the energy conservation requirements. If carries on the simulation by the FDS computer software, not can only present the simulation dynamic 3D the situation, but also calculate the operational data at any positions (including smoke ingredient, smoke temperature and visibility and so on). The simulation may also save the resources and the cost. Therefore discussion and comparison between experiment and simulation are necessary. This research will propose the comparison results of the future building performance design. Also the results will provide design and simulation suggestions for the building smoke control system and smoke layer design.

**關鍵字：**Smoke control simulation, Large-scale space, Full-scale smoke test, Performance design, Stadium