

A Study on Fire Risk Assessment and an Approach to Fire Hazard Reduction for a Semi-Conductor Factory

-Research & Development of Early Stage Fire Detection and Suppression System -

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Modern factories present an ever-increasing variety of potential and explicit fire risks as their production process and equipment become more sophisticated and diverse. Fire protection countermeasures, however, required by the Fire Service Act and the Building Standards Act, are uniformly regulated according to intended purpose. Consequently, it may seem that the countermeasures are not always appropriate to the various fire risks presented by a given facility such as a fire accident occurring at a semiconductor manufacturing plant in Japan. Through the existing academic and technical studies in Japan, the fire risk assessment and the most appropriate fire protection system that meet the requirements of the above mentioned plant were not available. Therefore, the research into these fire protection countermeasures and approaches to fire risks in the UK and USA is needed to determine the fire risks presented at the above mentioned semiconductor plant, establish a rapid fire detection and fire fighting system in the early stage of fire to mitigate the risks, test the system, and verify the effectiveness of the system.

Since any delay in the initial response to a fire will lead to increased damage and interrupt operational continuity, it is important not only to comply with the Fire Service Act and other fire regulations but also to promote the plant's own hardware countermeasures for disaster prevention. If not, it will be difficult to make any major improvement in reducing the number of fire-related accidents. The following Fig.1 shows the comparison of the fire effectiveness between the newly developed spot type air foam fire fighting system (A) and ordinary air form system(B).



(A) 2 seconds after discharging air foam agent from test nozzles



(A) Fire was extinguished 6 seconds after discharging air foam agent from test nozzle



(B) 2 seconds after discharging air foam agent from JFEII approved heads



(B) Still burning 6 seconds after discharging air foam agent from JFEII approved heads

Fig.1 Comparison of the fire effectiveness between the test nozzle and the JFEII approved head

It was proved that the fire could be significantly suppressed by the newly developed spot type air foam fire fighting system. However, in the future, engineers will have to verify any speed-up of fire extinguishing and whether fires can be reliably extinguished.