

Efficiency of water mist turbines in stationary fire prevention systems for hangars and recycling centres

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[Background] Water mist is known to be very effective for cooling, firefighting and gas mitigation purposes. Due to the low mass and low kinetic energy of water mist droplets, the throw distance of water mist nozzles is low (5-15m) if compared to traditional firefighting devices like monitor nozzles (60+ m). Firefighting turbines are high speed blowing devices that generate water mist and distribute it over 50-70m distance, representing an efficient and water/foam saving technique for firefighting.

[Objective] We tested the efficiency of the technique in stationary applications, in order to collect the data necessary to draft the guidelines for system designers.

[Method] Tests have been conducted on airplane fuel pans (Picture 1) for different flow rates of water mist (180 l/min to 800 l/min), for different application methods (direct and indirect application), for different sizes of fuel pan (1m² to 15m²) and using two types of extinction fluids (water and foam mixture).

The data of flame temperature, air temperature, heat flux and flue gas diffusion were collected and analysed.

[Results] We observed that:

- (1) With the increase of fuel pan size, the maximum temperature and the maximum heat flux of the tunnel increased reaching the highest temperature of 1086 °C and 17.5kW/m².
- (2) The extinction time did not increase when increasing the pan size. The extinction time with foam on the biggest pan (15m²) was 28s.
- (3) a 3% foam mixture enhanced 5 times the fire extinguishing effect compared to water only.

[Main conclusions and recommendations] The results were used to draft the recommendation of an Asian guideline for stationary turbine-based firefighting systems in hangars

As a next step, we will study the efficiency of the water mist turbines in other field-specific application like wood recycling or waste management, where the potential fuel can be wood chops, plastic or other solid material. (Data may also be available by the time of IWMC conference.)

KEYWORD: Turbine Aided Firefighting, water mist turbine, aerosol cannon, hangar fire protection, stationary turbine systems.



Picture 1