The advantages of water mist – the fire-fighting system and the complex organisation behind it

The International Water Mist Association take a look at how the demand for water mist technology is growing, and the numerous and varied environments it can be applied in

Ragnar Wighus, IWMA President and chief scientist at SP Fire Research Norway, says: "Water mist fire-fighting systems are well established and have been in use for well over 20 years in their present stage of technology." Funnily enough there are still a lot of building engineers, architects and also fire officers around who do not know that much about this not-so-new technology.

Many people still ask: How does water mist work? The answer is easy. A fire needs three elements to add up to a fire triangle: The combustible material, heat and oxygen. Water mist removes two of these items: Heat and oxygen – traditional sprinkler systems only remove the heat. This means that water mist suffocates the fire. This also means that it interacts with the flames in a way that it can be used to fight fires where normally water would not be the right or best agent.

What happens is that the system sprays water at low, medium or high pressure through specially designed nozzles. As the system pressure increases the size of the droplets decreases. This results in droplets with an altogether larger surface and water turning into steam. Thus the system is able to reduce the temperature as well as the oxygen at the flame front rapidly. This way energy is subtracted from the fire. On top of that the cooling effect prevents re-ignition.

Low pressure water mist systems remain under 12.5 bar (175 psi). The span of medium pressure systems lies between 12.5 and 35 bar (490 psi) and high pressure systems can reach a pressure of up to 120 bar (1,680 psi). Each of these systems has its eligibility, high pressure being suited for different purposes than medium or low pressure and vice versa.

The next question usually is: Where can water mist be applied? The answer to this question is just as easy. However, it takes a little longer to answer it as the list of applications is long. In fact some say that the only applications where water mist may not be the best solution, when it comes to fire suppression, are warehouses and storage areas. But what else is there? There are tunnels, offices, car parks, saunas, hospitals, care homes, atriums, churches and cathedrals, museums, archives and libraries, cable tunnels, power stations, machinery spaces, escalators, data centres and high-rise buildings. When it comes to the marine sector, water mist technology protects passenger ferries, container ships and oil rigs. Over the years speakers at the International Water Mist Conference have talked about concert halls, main stations and industrial oil cookers. Water mist systems have been installed in the Hungarian Parliament, the Clock Tower at Mecca, the 'Elbphilharmonie' in Hamburg and St. Patrick's Cathedral in New York as well as the Channel Tunnel between the UK and France. They protect old wooden churches in Scandinavia and new buildings made from brick, glass and steel all over the world.

As less water is needed the technology is a good choice for regions like the Middle East where water is scarce and therefore precious. Less water also ensures that next to fire damages also damages caused by water are reduced. Just think of an old and valuable painting that is lost because of the large amount of water it has been soaked in.

Less water also makes water mist systems cost effective. Apart from that, water mist systems are reliable, environmental friendly, they cause no ozone depletion and do not contribute to global warming. On top of all this they do not harm human lives. If a fire breaks out they can be activated immediately – unlike some gaseous systems. Ann Micheli, Managing Director at Ultra Fog, speaks about the 'fear factor' in this context. She says: "In hospitals and residential buildings, the advantage of water mist is that you do not have to evacuate people before activating the fire system."

Furthermore water mist systems give architects the freedom to be creative. Rüdiger Kopp, General Manager for fixed systems at Cologne-based Fogtec, explains: "Water mist solutions are often applied when it comes to special-purpose solutions and unusual hazards." He continues: "The core of water mist is the engineering approach. We do not set prescriptive standards. We find solutions via a performance-based approach for completely new and out of the ordinary projects." And there are indeed a lot of extravagant and extraordinary buildings around the globe which have been equipped with water mist fire-fighting systems. There are for example the Credit Valley Hospital in Mississauga, Canada (a project by Marioff, Finland) or the Isala Clinics in Zwolle, Netherlands (a project by Danfoss Semco, Denmark) to name but just two. These are two examples of projects where high pressure water mist systems were installed and this naturally incorporates the development of special components. But, as already mentioned, there are also low pressure water mist systems. Alex Palle, CEO of VID Fire-Kill, explains: "With low pressure it is possible to use more conventional system components which can be sourced locally and which in the end reduces costs and saves time." VID Fire-Kill's webpage demonstrates what he says. Under references there is a list which includes amongst others: Care homes, schools, hotels, car parks, machinery spaces and aircraft hangars.

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Apart from fixed water mist systems there are also mobile systems such as water mist lances or nails and fire extinguishers. Here one field of action is the marine sector. In fact, the IMO's (International Maritime Organization) Sub-Committee on Fire Protection introduced new requirements for fire protection on board of ships in January 2013. These say that it will become obligatory to carry water mist lances on board of new container ships that are constructed on or after January 1 2016.

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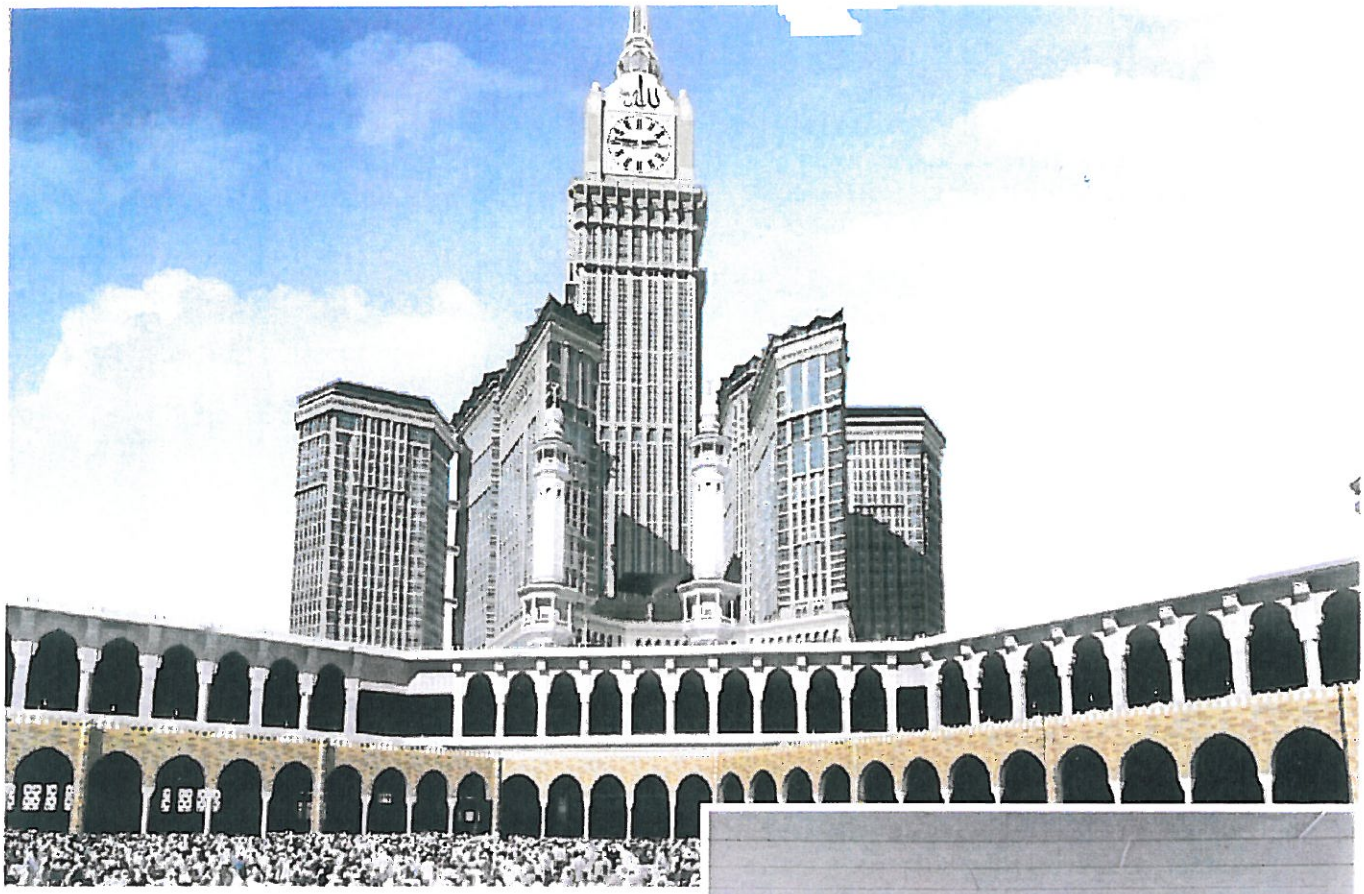
The forum which unites manufacturers, distributors, insurance companies, independent institutes etc. is the International Water Mist Association (IWMA). The organization was founded in April 1998. The first two years were a phase of initiation during which the few members merely worked together on joint research projects and established a first working group which collected existing guidelines for standardisation worldwide. Dirk Sprakel, Chief Executive Officer at the Cologne-based company Fogtec and current deputy chairman of the IWMA board of directors, says: "The first two years were a time of casual exchange of thoughts and ideas, but as time went on our plans became more palpable."

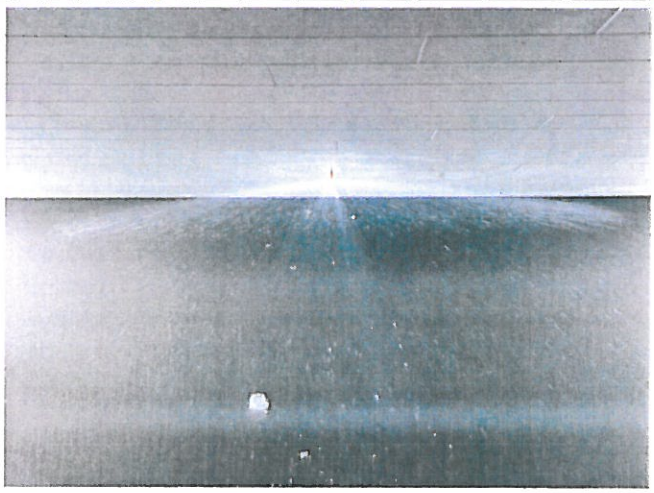
At the beginning of the 21st century things started moving, and in April 2001 the first International Water Mist Conference (IWMC) was organised in cooperation with Factory Mutual Research from the USA, the Norwegian fire research laboratory SINTEF, the Swedish testing and research institute SP and the Finish institute VTT.



The purpose of this conference, which took place in Vienna, Austria, was to introduce the IWMA and to put water mist on the map of the fire-fighting market. The aim was also to show that the technology is not an auxiliary technology but a sufficient method to extinguish fires, being completely independent from traditional sprinkler systems.

At first water mist and consequently IWMA were met with scepticism, resentment and even open opposition. Many things have changed since then - largely thanks to better education. One of the key turning points was a research project sponsored and organised by the IWMA on the scaling of fire suppression characteristics in machinery spaces, which was carried out by SINTEF on behalf of IMO. The presentation of the outcomes at IMO in London in February 2009 was a key event for the association. Another important milestone was the opportunity to support the European Committee for Standardization, thus to contribute to the CEN-guidelines. Nowadays IWMA holds a liaison with CEN and also supports the European Commission (Expert Group on Marine Safety) and continues to support the IMO with their work.

In 2013 IWMA started its own research project entitled: 'Water Mist – an alternate Solution to Sprinkler in Building Fire Protection'. The first phase was completed in 2014, the results were presented at the 14th IWMC in Istanbul, Turkey, by Rajko Rothe of the Institute for Applied Fire Research (IFAB). IFAB had collected details of presently available test protocols for automatic nozzles. Also test scenarios, acceptance criteria and other details were compiled in this phase. The full report can be obtained from IWMA.



All this has happened and is happening over one hundred years after the idea about small droplets fighting fires first emerged. Back then, in 1880, the US company F.E. Myers manufactured a back pack system with a lance that produced water droplets and was used to fight small forest fires. About 30 years ago came the ban of halon and in 1990 a devastating fire on board the Scandinavian Star killed 158 people – these two incidents paved the way for the further adoption water mist. Who remains to be mentioned are two men – Krister Giselsson and Mats Rosander – who in 1978 wrote a lecture book called 'Fundamentals of Fire'. They wrote: "In the future a liquid, e.g. water, atomized to drops smaller than powder grains will be the most important extinguishing agent against flames indoors, so-called fine mist."

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