APPLICATION & ACTIVATION

PAST, PRESENT AND FUTURE

THE HISTORY OF water mist began in 1880 when American company F.E. Myers developed a portable system including a lance which produced small water droplets. This back-pack system was used to fight forest fires. However, the idea of turning water into a mist to control, suppress or extinguish fires did not take off back then – the initial idea had been to take a bucket rather than a thimble full of water to tackle a fire. Nevertheless some people believed in the idea. Bettina McDowell of the IWMA takes up the story.

In early 2015 the International Water Mist Association (IWMA) organised a seminar in Lund, Sweden, at the local university. One of the speakers was Magnus Arvidson, project leader at SP Fire Research Sweden. He gave a presentation on the pioneers of water mist, amongst others Krister Giselsson and Mats Rosander. In their lecture book "Fundamentals of Fire" they wrote: "In the future a liquid, e.g. water, atomised to drops smaller than powder grains will be the most important extinguishing agent against flames indoors, so-called fine mist." That was in 1978.

The execution of the Montreal Protocol in the late 1980s levelled the way for water mist fire-suppression systems as it led to a ban of halon. And so did a tragedy. On the morning of 7th April 1990 a fire broke out on board the passenger ferry "Scandinavian Star" killing 158 people – nearly 50% of the passengers. This resulted in an improvement of the International Maritime Organisation's (IMO) fire safety requirements and installation guidelines and fire test procedures for alternative sprinkler systems were developed.

HOW DOES IT WORK?

A fire triangle consists of a combustible material, heat and oxygen. Water mist removes heat and oxygen – traditional sprinkler systems remove the heat only.

Water mist systems operate at low (less than 12.5 bar / 175 psi), medium (between 12.5 and 35 bar / 490 psi) or high pressure (up to 120 bar / 1,680 psi). They all spray water through nozzles especially designed for this purpose. The higher the system pressure, the smaller the droplets. And: the smaller the droplets, the larger the overall surface. Water turns into steam and the system reduces the temperature and the oxygen. Thus energy is taken away from the fire and the cooling effect prevents re-ignition.

To get an idea of the area that can be protected, Ultra Fog reports that they have recently tested and gained approval for a new high performing water mist nozzle, which can protect up to 48 square metres.

Some manufacturers specialise in low others in high pressure systems. Again others like to offer their clients a palette of possibilities and even combine water mist with further components. IWMA member Tyco for example has developed a hybrid water mist solution comprised of water and nitrogen. "This technology is currently being utilised to protect machinery spaces, which present a difficult scenario for fire suppression solutions, due to highly obstructed areas" says Alex Palau, Global Product Manager Water Mist, Tyco FPP.

As far as the question "Where should the different systems – low and high pressure – be installed?" is concerned, there is more than one approach. Alex Palau says: "High pressure is recommended when piping dimensions or water pressure losses are critical, for example for heritage buildings, libraries and archives, where excessive water damage and fragile infrastructure require specialist care and attention to adhere to conservation, preservation and restoration requirements." VID Fire-Kill is a producer of low pressure water mist systems. CEO Alex Palle says: "The large water ways and orifices in the low pressure water mist system make the entire system less sensitive for impurities, making it more robust. With low pressure it is also possible to use more conventional system components which can be sourced locally and which in the end reduces cost and saves time."

APPLICATIONS

Water mist systems can tackle a wide variety of fires. Examples of applications are tunnels, ships and ferries, oil rigs, offices, escalators, high-rise buildings, data centres and cable tunnels in power stations. Over the years, speakers at the International Water Mist Conferences have presented case studies on – amongst others – modern central stations, wooden churches and brick cathedrals, new hospitals, old museums and saunas. Water mist systems are installed in projects such as the Eurotunnel and the new concert hall "Elbphilharmonie" in Hamburg. The great advantage water mist has in the offshore oil and gas industry is the immense cooling effect which can reduce fire damage to a minimum. Marco Pesaola, Technical Manager at Eusebi Impianti, reports that there has been a growing interest in water mist systems from nuclear power plant operators in recent years. He says: "Interestingly, some are retrofit projects in facilities that are between 20 and 30 years old."

Overall one can say that in some cases water mist is the better choice because of the way it interacts with fires (industrial oil cookers), in other cases it is the limited water requirement that tips the scales (projects in desert countries). And: all applications are based on full scale fire tests to ensure that the water spray produced by any particular system can deal with exactly the type of fire that may occur in specific buildings or industrial plants.

WATER MIST IN THE MIDDLE EAST

In the Middle East there are two important factors: water is precious and there are many high-rise buildings in places such as Dubai and Abu Dhabi. Transporting water to the top floors is a challenge for

Credit: SL Rasch GmbH

Clock Tower in Mecca, Saudi Arabia

traditional water-based firefighting systems. The solution is water mist systems which require less water to be stored in the first place and less water to be pumped up to higher floors.

Quite a few clients in the Middle East have turned to water mist as a solution. And indeed the list of projects is continuously growing. The German company Fogtec reports high pressure systems installations in the New Carpet Museum in Mashhad, Iran; the Sultan Qaboos University Library, Oman and the Clock Tower in Mecca of which Rüdiger Kopp says: "The Royal Clock Tower in Saudi Arabia is a typical example of special architecture and fire protection challenges for which water mist technology offers most advantages over all conventional fire protection systems."

DESIGN AND SOLUTIONS?

Many of the nozzles and system components are favourable from an aesthetically point of view. The thin pipes are often made of stainless steel and the nozzles can easily be integrated into most buildings.

Rüdiger Kopp, general manager for fixed systems at Cologne-based Fogtec, explains: "When it comes to fire protection sometimes conventional solutions cannot be applied. This is where water mist comes in." Kopp continues: "A manufacturer of water mist systems can go for a performance-based approach and does not have to stick to a prescriptive standard." This can be seen as a disadvantage and it may indeed have been one in the past as for example planners and fire prevention officers may not have wanted to rely on a system which had not been specified in every single detail. However times are changing and Kopp adds: "As carried out fire tests are specified in the guidelines and as the area of application which is described in the protocols becomes broader, guidelines are becoming more transparent."

ADVANTAGES AND STANDARDS

"Water mist firefighting systems are well established and have been in use for over twenty years in their present stage of technology", explains IWMA president Ragnar Wighus, also chief scientist at SP Fire Research Norway. Apart from this they are reliable, cost effective, environmental friendly and do not cause massive water damage. In contrast to some gaseous firefighting systems water mist can immediately be released after the detection of a fire, without any hazard to human life. Being a suffocating chemical compound this is not possible with CO2-systems. If this kind of system has to be started up manually the "fear factor" as Ann Micheli, Managing Director at Ultra Fog, calls it, may delay the activation. "In hospitals and residential buildings, the advantage of water mist is that you do not have to evacuate people before activating the fire system", she adds.

As far as standards are concerned water mist has become well established. The first body to create a standard was the National Fire Protection Association with its "NFPA 750 Standard for Water Mist Fire Protection Systems" (first published in 1996 and revised in 2015). Apart from that there is the CEN/TS 14972 – currently a technical specification. But it is also available from CEN the European Committee for Standardisation as a draft for a European norm: prEN 14972.