

Picture courtesy of Fogtec



**Ragnar Wighus**



**Bettina McDowell**

International Water Mist Association

# Water Mist Technology

## – History, Effectiveness & Efficiency

In recent years, water mist technology has “come of age” and is now widely regarded as a fire protection solution of choice for a fast expanding catalogue of applications.

The idea behind contemporary water mist technology is by no means new. Over 130 years ago in 1880 the US-American company F.E. Myers manufactured a back-pack system with a lance that produced water droplets that was used to fight small forest fires. Only ten years later Grinnell developed its ‘pepper pot’ nozzle that fought fires also using small water droplets. By 1930 there were already several companies that had started to get involved in the application of water mist or water fog. Among those was the German company, Lechler, whose main innovation was a multiple orifice nozzle that they, at the time – the 1930s – called water dust nozzle. In the 1940s Factory Mutual’s engineering division started to carry out its first tests comprising small droplet nozzles.

In spite of these first efforts, the interest in water mist remained meagre over the following decades. Scientists in Europe and the USA were busy with research. But from a commercial point of view the water mist technology initially had no great impact, as it did not meet the requirements for fixed installations back then and was therefore mainly used to fight fires manually.

It was not until the 1990s that water mist started to become a force to be reckoned with. This was mainly due to two incidents.

### Incidents Levelled the Way for Water Mist

The first was the execution of the Montreal protocol on “substances that deplete the ozone layer” in the late 1980s; the second was a fire on the passenger ferry “Scandinavian Star” on the morning 7th April 1990. During this fire 158 people – nearly 50 percent of all passengers on board – were killed.

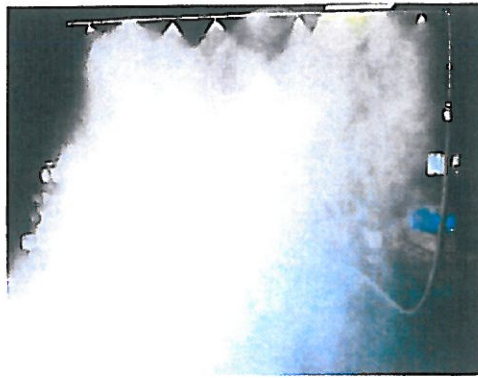
Up until the Montreal protocol had been signed, Halon – a bromine-based chemical fire suppression agent – had done a good job as a fire extinguishing media. It was effective, efficient, fairly cheap and easy to install. Its phasing out levelled the way for water mist fire suppression systems, which have consequently become an important field of study, research and development.

In areas such as fire protection it often takes severe incidents to bring about changes. The catastrophe on 7th April 1990 eventually led to an improvement of the International Maritime Organisation’s (IMO) fire safety requirements and installation guidelines as well as the development of fire test procedures for alternative sprinkler systems.

There had already been a good deal of development on high-pressure water mist in Sweden between 1975 and 1990. The main objectives had been systems to protect hotels and passenger



Picture courtesy of VID Fire-Kill



cabins as well as research into flammable liquid hazards. Thus the fire on the Scandinavian Star allowed those having carried out this work to show their results on 20th June 1990 – just over two months after the disaster.

This was the starting point of the newly-founded Swedish company UltraFog. Only six months later another company – Marioff from Finland – also started to develop high-pressure water mist fire fighting systems. Since then many have followed their example.

Eight years later – on 4th April 1998 – the International Water Mist Association (IWMA) was founded. Its intention was, and still is, to be a platform for companies, research bodies, institutes, insurance companies, authorities having jurisdiction and individuals involved in water mist technology. With its annual conference – the 13th will be held in Paris on 16th and 17th October this year – the IWMA collects and distributes knowledge.

### How Does Water Mist Work?

Part of this knowledge is to provide answers to questions like: How does water mist work? How effective is it? How much does it cost? And: How about standards?

A fire needs three elements to add up to a fire triangle: a combustible material, heat and oxygen. Unlike traditional sprinkler systems, water mist removes two of these items: heat and oxygen (traditional sprinkler systems only remove the heat). It does so by jetting water at low, medium or high pressure through nozzles specially designed for this purpose. As the system pressure increases the size of the droplets decreases, which results in droplets with an altogether larger surface and water turning into steam. The consequence of this is a system that is able to rapidly reduce the temperature as well as the oxygen at the flame front. In this way, energy is taken away from the fire. Due to its cooling effect, water mist also prevents re-ignition.

Low pressure water mist systems work with less than 12.5 bar. The span of medium pressure lies between 12.5 bar and 35 bar and high pressure systems can reach a pressure of up to 120 bar. Each of these systems has its eligibility; low pressure being suited for different purposes than medium or high pressure and vice versa.

As less water is needed to control or put out a fire than with a traditional sprinkler system, the water mist technology may be a very cost effective way of providing fire protection. It is also environmentally friendly, causes no ozone depletion, does not contribute to global warming, does not cause massive water damage, does not harm people and is reliable.

Also 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, which was published in 1996. Since then other standards and guidelines for the use of water mist have been developed by FM (FM 5560), the European Committee for Standardization (CEN TS 1497) and others.

### Water Mist in Asia and the Middle East

Water mist firefighting systems are well established and have been in use for over twenty years in their present stage of technology. They have proven to provide safety systems over a wide range of applications, such as tunnels, offices, machinery spaces, escalators and computer rooms to name just a few. In some of these applications water mist is favourable due to the way the small water droplets interact with fire. In other situations it is the limited water requirement that makes water mist systems the better choice.

The Asian ship building industry is the largest in the world. In the Middle East and Japan building technology is among the most advanced in the world. There are many high-rise buildings with a high concentration of inhabitants, large covered spaces, partly underground. Transporting water from ground level to the top floor is a challenge for traditional water-based firefighting systems, which normally operate at relatively low pressure. On top of that, water in desert environments is precious and its supply costly.

The reduced requirements for water supply for water mist systems lead to less water having to be pumped up to the higher levels of high-rise buildings, a smaller required water reservoir and smaller supply lines.

Water mist can be applied in oil and gas production, processing and distribution, particularly protecting buildings storing, using or processing liquid hydrocarbons. In the offshore oil and gas industry, water mist has replaced Halon as extinguishing systems in many applications. The great advantage of using water mist in these places is the immense cooling effect of small water droplets, which can reduce fire damage to a minimum. Water mist can, in contrast with some gaseous firefighting systems, be released immediately after the detection of a fire, without any hazard to human life.

Water mist systems protect life as well as properties. The systems that manufacturers offer – many of these companies are members of the IWMA – fulfil the requirements agreed upon by this organisation. All applications of water mist are based on realistic fire tests, to ensure that the water spray produced by the particular water mist system can suppress or extinguish fires of the type that may actually occur in the specific building or industrial plant.

In addition to the advent of less water requirement, many of the water mist suppliers have worked well with design of nozzles and system components, leading to aesthetically favourable installation with thinner pipes, often made of stainless steel, and nozzles integrated into the building.

To promote water mist, the IWMA organises manufacturers and users of water mist and is the leading factor in paving the way for the correct use of these firefighting systems worldwide.

The competitors of the water mist technology have always been, and still are, traditional sprinkler systems and systems using powder or gas to control or extinguish fires. However, in many surroundings, water mist systems are an alternative; sometimes even the better choice. It is therefore important to have a close look at all available systems to choose whatever is best. And given the chance, water mist systems can definitely stand up for themselves. **APF**

**Ragnar Wighus** is Chairman of the International Water Mist Association.  
**Bettina McDowell** is Association Secretary

For further information, go to [www.iwma.net](http://www.iwma.net)