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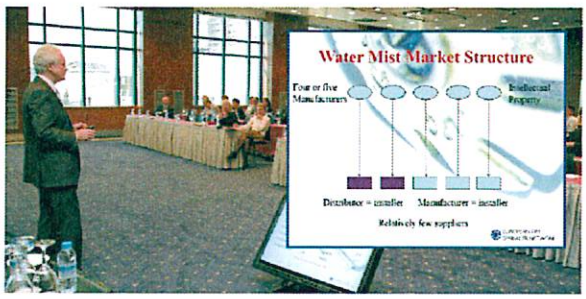
FORGING A CIRCLE OF TRUST

Landmark petrochem arrangement for sharing equipment, ideas and exercises

LOST IN THE MIST

The annual conference of the International Water Mist Association took place in Istanbul (Turkey) last month, bringing together the world's experts and practitioners in one place. Jose Sanchez de Muniain was there to report the highlights.



How does water mist fit into the water-based fire fighting world? Alan Brinson, European Fire Sprinkler Network

The aim of the European Fire Sprinkler Network is to see sprinkler systems and water mist used more widely and to be properly designed across Europe.

In terms of sprinklers per thousands inhabitants, Mr Brinson estimated the following:

US 125	Belgium 35
Norway 120	UK 28
Sweden 48	France 24
Germany 40	Spain 17
Netherlands 35	Italy 10

'Just to give an idea US and Norway are about on a par, but nearly everywhere else in Europe uses sprinklers far less than that. So we actually have a lot to do.'

Alan then presented the sprinkler market in terms of numbers of sprinklers (millions):

	IFSA 2007	EFSN 2013
Germany	2.8	3.3
Russia & Eastern Europe	2.5	2.5
United Kingdom & Ireland	2.2	1.7
France	1.6	1.5
Nordic	1.4	1.4
Benelux	1.3	1.0
Spain & Portugal	1.2	0.8
Italy	0.9	0.6
Austria & Switzerland	0.7	0.9
TOTAL	**14.6**	**13.7**

'The International Fire Sprinkler Association used to publish its estimates and stopped doing so, the last year it did it for was 2007. Using data and information from a number of sources I estimate there has been a decrease in the number of sprinklers sold compared to last year, but that is because construction has collapsed in some countries.

'Construction dropped by 25% across Europe but the sprinkler market only by 6%, so although the actual market size has decreased, I argue that the way sprinklers are perceived has not changed, and that they are used more widely and more intensely than they used to be. If and when construction picks up we will be in a good place, and we will see the market grow.'

Mr Brinson then contrasted the two very different facets of the sprinkler and water mist market structures.

Across Europe the sprinkler market is made up of four or five primary manufacturers who sell to literally hundreds of installers. There are few distributors of sprinkler hardware, and the intellectual property remains with the manufacturers. A rough estimate of market value places components at €250M, pipe at €400M, pumps and tanks at €150M, and installations at €3B.

Mr Brinson then presented the workflow for a typical sprinkler project: in the course of a building design the need for a sprinkler system is identified (eg building codes stipulate it); the system is specified (EN 12845, CEA 4001, NFPA 13/FM): 'Then you have a specification and the installers are invited to quote; so there are a number of quotations that will come in, all on the same basis for the same design specifications, and then one of them gets the work. And then they go to the manufacturers and ask them to quote, and then they buy the sprinklers, valves, and so on. That is the way sprinkler projects work.'

The workflow and market structure for water mist is very different.

Water mist began in the marine market where it 'swept the board', displacing previous technologies of sprinklers and carbon dioxide. 'Largely because there were some technical advantages, not really about money. Less weight, less space, and less free water.'

Since then, applications include IT suites, telecoms, and archives. 'And I think that water-mist can be more competitive than gas in terms of price in these applications. It has another advantage, in that there is no issue with leaky rooms, whereas the gas system needs the room to be airtight. This is far less critical in water mist, so in some way it is a more robust solution.'

Mr Brinson then compared water mist markets against sprinkler markets, remarking that the main difference was that sprinklers were usually installed because they were required by a building code.

Water mist is not always accepted by insurers as an alternative to sprinklers. 'In fact one quite influential individual in the insurance industry said to me a few years ago: "Over my dead body will I accept water mist instead of sprinklers." I have been working on him and his view is changing, but it is not as widely accepted in that area as you might think. Even though water mist has been around for more than 20 years sprinklers have been around for a lot longer and insurers have information from the market. They have real fires where sprinklers did the job and they can produce data to see what their losses were with and without sprinklers.'

The attitude may be changing as a result of all the research carried out into water mist, but not all insurers are convinced yet. 'It is still going to take a while and one crucial area is to have a European standard – a technical specification is just not good enough for many people, it is not something that is official and we can refer to. So it needs to be a standard and I can see now that this is going to happen.'

When competing with sprinklers another factor is water mains pressure. In some countries sprinklers can be directly connected to the water mains so there is no need for a pump or a tank. 'There will be areas where sprinkler systems do need a pump and perhaps water mist will have more luck in those areas in terms of being competitive.'

Going back to the comparison between the two markets, typically water

mist has to be explained and sold on a per-project basis to end users, officials and insurers. However, water mist has the upper hand in spaces where there is little room for pumps and tanks, such as in high-cost areas (eg central London) where every square meter counts. 'If there is a concern about water damage – for example with some heritage buildings and art galleries – you also have a good story to tell.'

A disadvantage of water mist is its market structure. The vertical integration of suppliers (often offshore) means competitive tenders are difficult. 'And because each water mist manufacturer has a different design manual, it is difficult to match systems to specifications on a like-for-like basis.

'You have a particular project in any country and there are probably only a handful of companies that can quote for it, as opposed to dozens of sprinkler installers.'

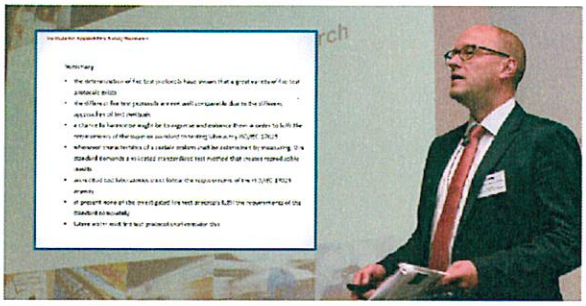
Typically for land-based projects a consultant is needed to identify that a water mist system can be specified as an alternative to a sprinkler system. 'The system cannot be designed from the standards. NFPA 750 alone is not enough to design a water-mist system. Whereas with NFPA 13 – as long as you can read – you can design a sprinkler system.'

Mr Brinson estimated that water mist had around 3% of the sprinkler market (for land-based applications), equating to around 100m euros per annum in Europe.

'The amount of business you are doing is so small that the sprinkler guys have not really noticed it yet.

Concluding, Mr Brinson added that it was absolutely crucial to complete work on standards in order to make it easier for water mist to be specified. 'And I think that you should widen the access to the technology, so more installers can generate more quotes for the same design.'

The water mist industry should also identify the few applications where water-mist could compete on cost with sprinklers ('and I know some have been looking at hotel retrofits'). He finished on an upbeat note: 'I think there is a lot of space for you to grow, but it is all about the money.'



IWMA research project, phase one – Determination of fire test protocols for the protection of buildings with automatic water mist nozzles; Rajko Rothe, IFAB

Rajko Rothe of IFAB (Institute for Applied Fire Safety Research, Berlin, Germany) presented a summary of the results of the first step of an ambitious project commissioned by the International Water Mist Association.

The aim of step one was to combine in one repository all the existing test protocols and procedures and the corresponding pass and fail criteria related to the protection of buildings with (thermally activated) automatic water-mist nozzles. A secondary aim was also to suggest future developments.

Step two of this project will be the development of an idea for the most suitable pass/fail criteria, with the possible development of a test protocol for automatic water mist nozzles having a wider field of application, and eventually to carry out actual fire tests to support the work.

Mr Rothe explained during his presentation that while the design criteria for conventional sprinkler systems was based on a large body of results from real live scenarios, no such data existed for the relative newcomer – water mist.

The performance requirements for the use of water mist for class B fires has been quite simple (extinguishment) but when applied to class A fires the acceptance criteria was more complex due to fuzzy definitions and the use of closed nozzles. 'There is a mix of unclear definitions as well as widely accepted definitions for fire control or fire suppression, but there is no clear definition of how to evaluate the performance characteristic of a system to suppress the fire.

'For a few years the comparison with conventional sprinkler systems as a testing reference provided clear pass/fail criteria. It was easy to say, "this water mist system has to be as good as a conventional sprinkler", but with the continuous development of water mist system it became obvious that the initial approach, the direct comparison, was limited. The fire fighting effects of sprinklers are not the same as water mist and a direct comparison became increasingly criticised.'

To complicate matters further, over the years different laboratories have been developing their own fire test protocols for water mist, as have been manufacturers in different countries.

The main source of information used by IFAB was Perinorm, the world's leading bibliographic database of national, European and international standards from more than 200 standards-publishing organizations in 23 countries, with a total of more than 1,400,000 records.

Mr Rothe went into some detail outlining the differences in approach taken by different water mist standards and protocols, including different definitions for hazards; test scenarios; fire loads; ignition source; test durations; test repetition; nozzle pattern; measurement criteria; methods of evaluation; and pass/fail criteria. 'The test protocols differ too much and it might be difficult to harmonise existing protocols to decide a superior fire test protocol for automatic water mist nozzles.' Another issue is the full reproducibility of the test procedures; when this aim is considered, perhaps a better approach would be to enhance the protocols by encouraging the tests to fulfil the requirements of the superior laboratory testing standard ISO/IEC 17025. 'This standard demands a validated standardised test method that creates reproducible results. And accredited test laboratories must follow the requirements of ISO/IEC 17025 anyway,' concluded Mr Rothe.

To receive a free copy IFAB'S final report contact the IWMA on info@iwma.net

Fire Protection for printing machines with high pressure water mist; Rüdiger Kopp, Fogtec Fire Protection

Fogtec's customer in this instance was a German company with around 3,000 employees and major factories in Germany and the UK – in fact, one of Europe's largest printers. The factory in Saxony housed six large reto-gravure printing machines that used large quantities of solvent-based colours. A previous fire protection system consisted of an aerosol extinguishing system which would be automatically released upon detection. A manually activated local protection CO_2 system had been installed as back-up.

On the 19th of May 2013 the fire station in Dresden received a callout and on arrival found one of the printing machines on fire. It took the fire brigade two hours to extinguish the fire with 160 firefighters and 25 vehicles, using 7,000

litres of water and foam. Positive pressure ventilation fans were used to ventilate the smoke, which caused soot particles to settle on walls and ceilings, as well as the printing equipment. The total loss equated to over 10m euro.

The company in conjunction with the insurer decided to extend the existing fire fighting systems. CO_2 was already being used in some parts of the printing machines as a local protection system, but an extension of these systems was not deemed suitable due to the open nature of these locations, as well as possible safety risk to the personnel. 'So this is when they came to look into high pressure water mist technology' explained Mr Kopp.

High pressure water mist technology was deemed the most favourable for a number of reasons, including no requirements for pre-warning; best cooling abilities with smallest amount of water; low impact to electric components; and lowest business interruption. A fire protection concept was reached, and a fire test laboratory developed a test procedure with the manufacturer, with a third party (VdS) having overview of the fire tests and protocols – in this case based on Annex B of CEN TS 14972 standard.

Protection concept

- Improvement of existing aerosol local protection systems in the paint trays of the five remaining printing machines with a high-pressure water mist system in three layers
- Deluge system with nozzle layout based on full-scale fire test results (560 open nozzles)
- Subdivision of each retro-gravure printing machine into 4 water mist sections via 4 section valves, whereby only one section is discharging water mist with 6% AFFF additive
- Integration of manual water mist fire fighting guns in wall cabinets for use by trained printing machine operation personnel (two Foggun wall cabinets)
- Detection by linear heat detection throughout the machine.

Rüdiger Kopp went into great detail regarding the work that went into creating appropriate tests to match the risk. The fire rig was 10x15 with 5m high ceiling, with natural ventilation. The pass/fail criteria was achieving extinguishment of all fires within 15 minutes of discharge. The fire load used was again matched to the risk where practically possible. N-Heptane was used to replicate Toluene colour solvent, and diesel instead of gear lubricant:

- Scenario 1 was a combined shielded pool fire and spray fire with n-Heptane, to simulate a rupture of a solvent based colour supply and a spillage of solvent based colours at a mixing unit.
- Scenario 2 was a pool fire with n-Heptane, to simulate a spillage of solvent based colours between two printing units.
- Scenario 3 was a combined shielded pool fire and spray fire with diesel, to simulate a rupture of a lubricant supply and a spillage of lubricant at the gear of a printing unit.
- Scenario 4 was a paper fire to simulate an accumulation of paper within the printing machine.

The tests were carried out a number of times. The pool fires were extinguished quickly as the water mist used an AFFF additive. The spray fires represented a bigger challenge, requiring around 9 minutes to be extinguished – but still well under the 15-minute pass/test criteria.

A wet pipe system is used to reduce the time delay between activation and detection. 'The concept foresees the activation of the four sections within one machine simultaneously, plus an additional gun for manual fire fighting. We have a full autonomy of the system for 30 minutes, so in this case 100% safety on top, with a 29m³ water tank.' Concluding, Mr Kopp pointed out that water mist had been demonstrated to be an excellent extinguishing agent for printing machine environment. Both Fogtec's customers and the insurer were happy with the results that could be achieved.