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SUPPRESSION

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 Munaiain 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 thousand inhabitants, Mr Brinson estimated the following:

- US 129
- Norway 120
- Sweden 68
- Germany 60
- 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):

- USA 2007: 3.3
- USA 2013: 3.3
- Russia & Eastern Europe: 2.6
- United Kingdom & Ireland: 1.7
- France: 1.6
- Nordic: 1.4
- Benelux: 1.3
- Spain & Portugal: 0.8
- Italy: 0.9
- Austria & Switzerland: 0.7
- TOTAL: 14.6

The International Fire Sprinkler Association used to publish its estimates and stopped doing so last year, but it did do one for 2007. Using data and information from a number of sources I estimate there has been a decrease in the number of sprinklers used 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%, 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 need be, 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 manufacturer. A rough estimate of market value places components at €25M, pipe at €40M, pumps and turbines at €150M, and installations at €1B.

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 H systems is specified DN 125/45, CEA 4001, NFPA 13:FMR). 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 you go to the manufacturer and ask them to quote, and then they try the installers’ 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 sprairl and carbon dioxide. Largely because there were some technical advantages, not really about money. Less weight, less space, and less firewater.

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 these are no laces 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 installers 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 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 face 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 in 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 sell to. So it needs to be a standard and one we can sell to that is going to happen.

When comparing 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
mists 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-rise areas (eg central London) where every square metre 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 terrains 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 acceptance criteria was more complex due to fuzzy definitions and the use of closed nozzles. There is a lack of clear definition as well as widely accepted definitions for fire control or fire suppression, but there is no clear definition of how to evaluate the performance characteristics of a system to suppress 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 complete 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 Penrhy, the world’s leading bibliographic database of national, European and international standards from more than 200 standards publishing organisations in 23 countries, with a total of more than 1.460.000 records.

Mr Rothe went into some detail outlining the differences in approaches taken by different water mist standards and protocols, including different definitions for hazards, test scenarios, fire loads, ignition sources, test duration, test repetition, nozzle pattern, measurement criteria, method 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 in the full reproducibility of the test procedures, when this 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 ISOEC 17025. This standard demands a validated standardised test method that creates reproducible results and accredited laboratories must follow the requirements of ISOEC 17025 anyway,’ concluded Mr Rothe.

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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 a large high-quality printing plant made up of a number of solvent-based Colour Printing plants. The Fogtec fire protection system consisted of an automatic extinguishing system which would be automatically released upon detection. A manually isolated local protection CO2 system had been installed as back-up.

On the 16th of May 2013 the fire station in Dresden received a callout and on arrival found one of the printing machines on fire. The fire brigades took two hours to extinguish the fire with 100 firefighters and 25 vehicles, using 7000
litres of water and foam. Positive pressure ventilation fans were
used to ventilate the smoke, which created some particulate to settle
on walls and ceilings, as well as fire fighting equipment. The total
loss equated to over 15m cubes.

The company in conjunction with the insurer decided to extend
the existing fire fighting systems. CO₂ 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 variable due
to the open nature of these locations, as well as possible unsafe
risk to the personnel. So this is when they came to look at 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 requirement for
pre-warning, best cooling abilities with smallest amount of water,
low impact to electronic components and lowest business
interruption. A fire protection concept was researched, 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

Protection concept

- Improvement of existing second local protection systems in
the paint rooms of the five remaining printing machines with a
high pressure water mist system in three stages
- Deluge system with nozzle layout based on full scale fire test
results (800 open nozzles)
- Subdivision of each single-pressure printing machine into 4
water mist sections via 4 section valves whereby only one
section is discharging water mist with 5% AFFF additive
- Integration of manual water mist firing guns in wall
cabinets for use by trained printing machine operation
personnel (two Fargoan wall cabinets)
- Detection by linear heat detection throughout the machine.

Rodger Kopp went into great detail regarding the work that
went into creating appropriate tests to match the risk. The fire rig
was 10x10 with 5m high ceilings with natural ventilation. The panel
failure 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-hexane was used to separate
toluene colour solvent, diesel in stead 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 5 minutes to be extinguished – but still well
under the 15-minute panel criteria.

The test rig system is used to reduce the time delay between
activation and detection. The concept focuses the activation of
the four sections within one machine simultaneously plus
an additional gun for manual fire fighting. We have a full anatomy
of the system for 30 minutes, so in this case 100% safety on top with
a 24/7 water tank. Concluding Mr Kopp pointed out that water
mist had been demonstrated to be an excellent extinguishing
agent for printing machine environment. Both Fargoan’s customers
and the insurers were happy with the results that could be
achieved.

Fike’s PROINERT® the
 Safest, Most Economical
Fire Protection Solution

- Naturally better for the environment, resulting in ZERO global warming potential.
- Cost-effective, flexible design options for easy installation & maintenance.
- Essential fire protection without damage caused by water-based systems.