High Pressure Water Mist for Laboratories and High Sensitive Areas
Headquarter in Linz/Austria
topics

- Typical Applications
- Requirements (Customer, Consultants, System Integrator)
- Technology Comparison
- Specific Requirements Project Execution
- Case Study Full Scale Fire Test

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Typical applications

- Laboratories
- High sensitive test benches
- Clean Rooms
- Semi conductor production lines
- Chemical plants
- Server Rooms
- Electrical Rooms

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Requirements (Customer/Consultant)

- System with immediate effect and immediate return to service after an activation
- Reducing of contamination by smoke
- Avoiding of contamination by extinguishing agent
- “Small size” retention area for fire water
Risk and Challenges

⚠ Risk of fast spreading of fire caused by flammable solids, liquids, cables...

⚠ Several potential fire sources in working process

⚠ Risk of loosing infrastructure and products

⚠ Risk of loosing availability of infrastructure and productivity (downtime costs)

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Requirements

- Applicable test reports for varying fire loads
- Knowledge in handling different surrounding conditions (cold, hot, aggressive, ...)
- Knowledge of production / working process to ensure adequate design to reach protection target
- Experienced installation team not to influence daily working process and productivity of sensitive area during installation
### Evaluation of fire risks

<table>
<thead>
<tr>
<th>Standard HPWM application</th>
<th>Special attention for</th>
</tr>
</thead>
<tbody>
<tr>
<td>flammable liquids and gases</td>
<td>metal fires or other fire loads reacting with water.</td>
</tr>
<tr>
<td>Solids like insulations, plastics, rubber, cables, powder, food, ...</td>
<td>Protection of areas containing chemical agents reacting with water</td>
</tr>
<tr>
<td>Surrounding: Ventilation, high voltage, ...</td>
<td>High voltage equipment has to be considered case by case</td>
</tr>
<tr>
<td>Intervention: Manual, availability of fire brigade, ...</td>
<td>Intervention time according regulations sufficient?</td>
</tr>
</tbody>
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# Available Technologies

<table>
<thead>
<tr>
<th></th>
<th>Conventional Gas System</th>
<th>Conventional Sprinkler System</th>
<th>High Pressure Water Mist</th>
</tr>
</thead>
<tbody>
<tr>
<td>costs</td>
<td>(+)</td>
<td>(+/-)</td>
<td>(-)</td>
</tr>
<tr>
<td>Risk for humans and environment</td>
<td>(+/-) depending on gas type</td>
<td>(+/-)</td>
<td>(+)</td>
</tr>
<tr>
<td>Risk of damaging highly sensitive equipment</td>
<td>(+)</td>
<td>(-) high amount of water</td>
<td>(+)/(-)</td>
</tr>
<tr>
<td>Immediate reaction</td>
<td>(+/-) after evacuation time</td>
<td>(+)</td>
<td>(+) harmless to human</td>
</tr>
<tr>
<td>Costs for return to operation after activation</td>
<td>(-) all gas bottles to be changed</td>
<td>(-) Removal of contaminated water</td>
<td>(+)</td>
</tr>
<tr>
<td>Time for return to service after activation</td>
<td>(-)</td>
<td>(-) huge water tank</td>
<td>(+) only small water tank to be refilled</td>
</tr>
<tr>
<td>Maintenance costs</td>
<td>(-)</td>
<td>(+/-) lifetime</td>
<td>(+) cheap, investment pays off on longer term</td>
</tr>
<tr>
<td>Economical for large facilities</td>
<td>(-)</td>
<td>(+/-)</td>
<td>(+) easy extensions possible</td>
</tr>
</tbody>
</table>
Highest efficiency

- 3-dimensional extinguishing effect
- Continuous cooling, reaching hidden areas and protection of equipment around fire zone
- Cleaning effect of flue gases and smoke
- Minimal influence on electrical and electronic components

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Harmless to humans

- Drinking water as suppression agent
- Water mist supports development of viable surrounding conditions
- Immediate activation without warning time and no danger to service staff
- No significant change of the evacuation time
Excellent functionality

⚠️ Compact design and long lifetime
⚠️ Reduced pipe dimensions usually between DN10 and DN20 for nozzle lines and DN25 to DN32 for main lines
⚠️ Easy structural integration and retro fit installation
⚠️ Stainless Steel AISI 316L for piping, nozzles and fittings for pressure level 160bar

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Minimal Water consumption

⚠ Reduced risk of contamination and water damaged

⚠ less water required:
... 5 ltr/m² of sprinkler system
... versus 1,2-1,9 ltr/m² for Water Mist system

⚠ Use of demineralized or purified water possible (no conductivity, no pollution)
Add on solutions

Initial fire fighting tool for service staff and workers in factory areas

△ For stand alone solution or integrated into existing suppression systems

△ High pressure hose reel with 20-50m length and Water Mist Gun with 20-30l/min jet tool

Bulk head connectors

△ For fast and easy integration into wall breakthroughs
Conclusion 1

High sensitive areas require flexible and efficient fire fighting systems

△ High efficiency:
  - handling of complex fire scenarios
  - handling of wide range of different fire loads
  - immediate activation after detection

△ Less risk for equipment and infrastructure even in case of false alarm

△ Using minimum water amount: less risk of water damages minimized amount of contaminated suppression water

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Conclusion 2

High sensitive areas require flexible and efficient fire fighting systems

△ Easy recommissioning
   - within short time
   - small (no) costs for any refilling, ...

△ Harmless to humans and enviroment!!!

Reduced risk for operators and employees and increased system availability

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project realization
Realization process

**Timeline**
- Input from customer/consultant:
  - Tender Specification and Customer requirements
  - Evaluation of required risk class for all protected areas

**Check with Manufacturer certificates:**
- Risk class for all areas covered by certificates?
- Size of covered area within limitations of certificate?
- All other client requirements fulfilled?

**Way to realize the project:**
- YES: Project execution according existing design guideline and installation instruction
- NO: Development/Evaluation process necessary

**Project Progress in case of evaluation and using existing certificates**
R&D Certification Process

Project Progress in Case of CFD or Real Scale Fire Test

Definition of Parameter for CFD Simulation
CFD Simulation
Definitio of Fire Test Scenario
Real Scale Fire Test
Issue of design guideline and installation Instruction
Additional product Certifications
Project Execution
Design Validation and final Inspection
case study fire test
Case study: Fire test

Research target

△ Verification of a water mist system for “R&D test benches”

Protection objectives

△ Safety for operators of test bench
△ Monitoring of Surrounding conditions
△ Optimization of Detection System

...in detail

△ Preparation of a comprehensive test spec
△ Set up of full scale mock up incl. ventilation
△ Execution of full scale fire tests
△ Certification by accredited test laboratory

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Full Scale Fire Test (free burn)

⚠️ activation after full developed fire at t=11′41″
Full Scale Fire Test (free burn)

- > 11 min pre-burn until fire fully developed
- Temperatures down to less than 80°C within 1 min
Full Scale Fire Test (acceptance test)

activation after full developed fire at $t=1'58''$

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Full Scale Fire Test (acceptance test)

- Detection time: 30 sec
- Activation: after 2 min pre-burn time
- Temperatures down to less than 40°C within 1 min
Thank you!