

The Smarter Way of Using Fire Protection in Rolling Stock Applications – How innovative and active solutions could help to increase safety

Wednesday, Oct 16, 2019 01:45 PM - 02:05 PM



INTERNATIONAL
Railway Safety
Council Conference
AUSTRALIA 2019

Contents of the presentation

- Introduction to Company
- On-board fire and fire-related risks in railway transport
- Active fire detection and firefighting solutions to ensure passengers' safety
- Examples of solutions
- Question time

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About the Company:



**Head Quarter in Cologne,
Germany**

Office China, Shanghai, China

FOGTEC France, Paris

FOGTEC Spain, Madrid

FOGTEC Austria, Vienna

FOGTEC India, Mumbai



Worldwide more than 15.000 Systems supplied and installed for Rolling Stock applications in:

- Metro trains
- High Speed Trains
- Regional Trains (DMU and EMU)
- Double Deck Trains
- Locomotives (Electrical and Diesel)
- Light rail Vehicles
- Monorails
- Track Working machines



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Key Challenges...

- Where is the fire?
- Where is the train at the time of the fire (route could be in tunnel or on via ducts)
- Is the train at full line speed at time of fire?
- Does the driver take correct action once fire is discovered?
- Do the passengers successfully evacuate the car affected by the fire?
- Does the fire escalate?
- Does the train stop in a place of safety?
- Can affected passengers safely egress from the train?
- Can the passengers be recovered safely by the Train Operating Company?

Consequences...

Severity	Negligible	Marginal	Critical	Catastrophic
Frequent	B	A	A	A
Probable	C	B	A	A
Occasional	C	B	B	A
Remote	D	C	B	B
Improbable	D	D	C	C
Incredible	D	D	D	D

Tolerability Key:

- **A = Intolerable**
- **B = Undesirable**
- **C = Tolerable with endorsement**
- **D = Tolerable**

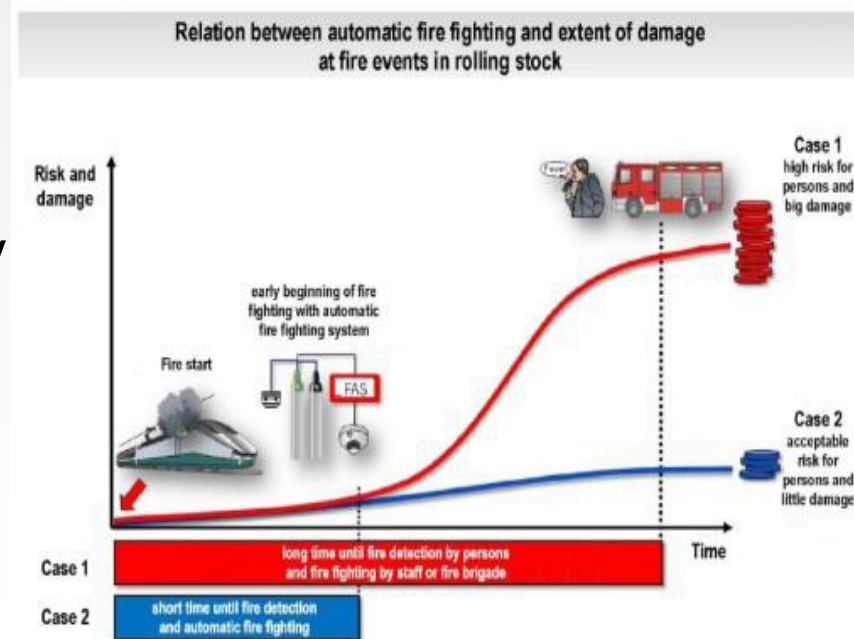
On-board fire and fire-related risks in railway transport

Main fire related risks on railway transport

- Difficult evacuation
- Limited spaces – quick volume saturation
- Gas and smoke production
- Crowd
- Panic

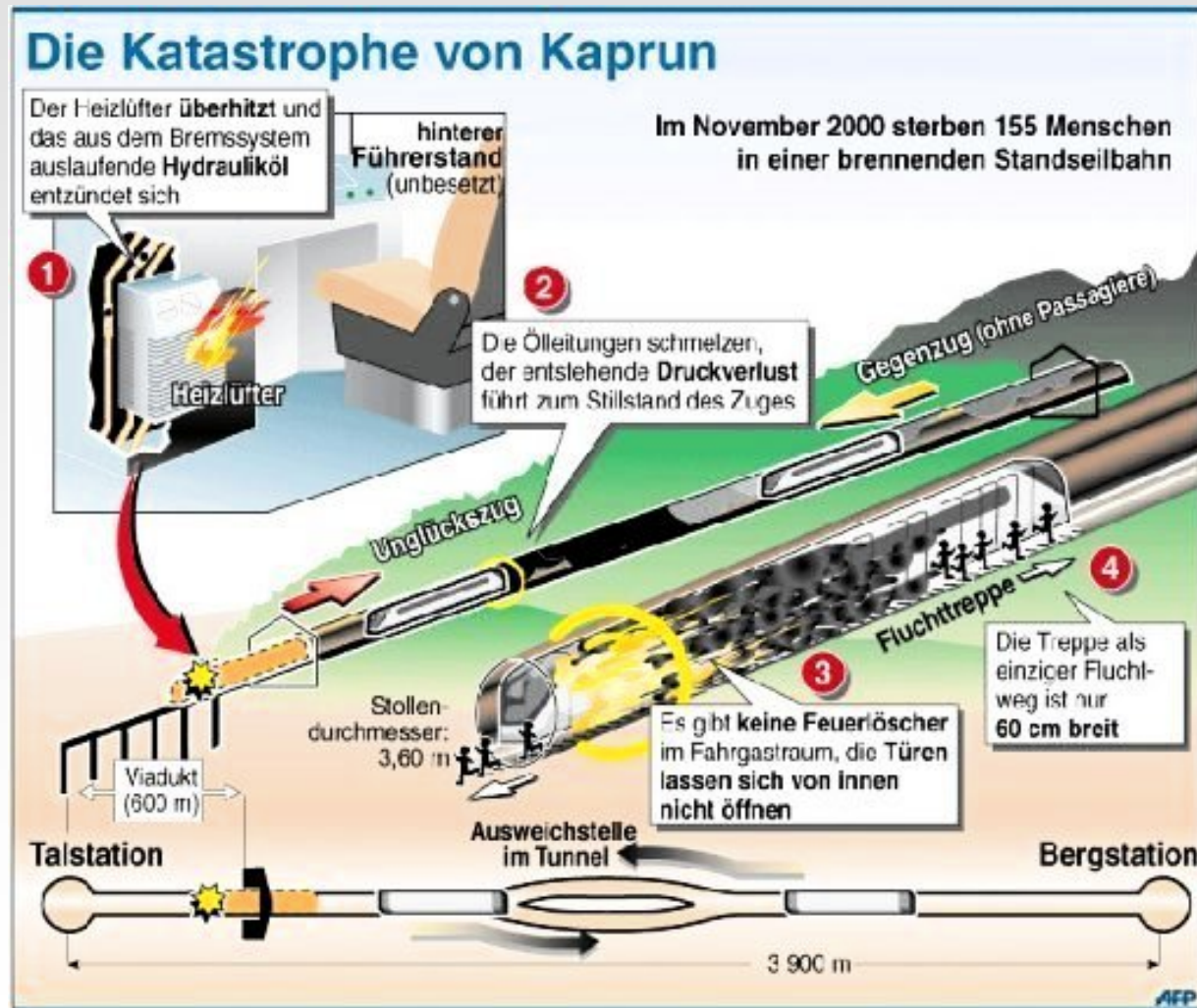
Active Fire Protection systems Provide:

- Time...to investigate and understand the threat
- Time...to prepare staff and visitors
- Time...to stage the response and avoid the cost of nuisance alarms
- Time...to investigate options for control of the fire
- Time...to transfer data and processes to redundant systems
- Time...to evacuate
- Time...to suppress the fire
- Time...to ensure business continuity

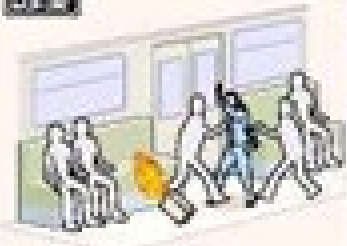




Cable Car Kaprun (Austria), November 2000, 155 dead



2004



1234



The arsonist Kim Gae Hwan took the train no.1079 at Myeongdeok Station

The train was stopped on platform of Jungangno Station, and the door was opened. No sooner than the arsonist set the fire.

The arsonist threw a gasoline bottle to car rear, set fire and ran away, and the passengers escaped.

Fire report requested at the Fire Headquarters

Train no. 1080 was departed from Daegu Station

Train no. 1080 was entered in Jungangno Station

Power supply will shut down

The fire spread

The anarchist in the hospital was arrested

The fee was increased

The bodies were found in the burned train.

995

조각가 이름:
 김형자(하선자) 및
 자화상 원본

지하철: 대합실, 역무사실, 전시장

주요 내용: 2014년 10월 1일부터 시행되는 「소득세법」 개정 내용

[illegible]

Jungangno St.

물고기 위생의 스포츠맨
(2011. 7월 발행)



Sleeper Coach Wagon, November 2002, 12 dead

Brand im Nachtzug



Der D 261 Paris – München

- Paris ab 22.58
- Karlsruhe an 04.56
- München an 08.51



Quelle: dpa



On-board fire and fire-related risks in railway transport

Main causes of initial fire source

- Electrical failure
- Diesel engines or heaters
- Misuse
- Vandalism/arson/attack

Main causes of fire spread:

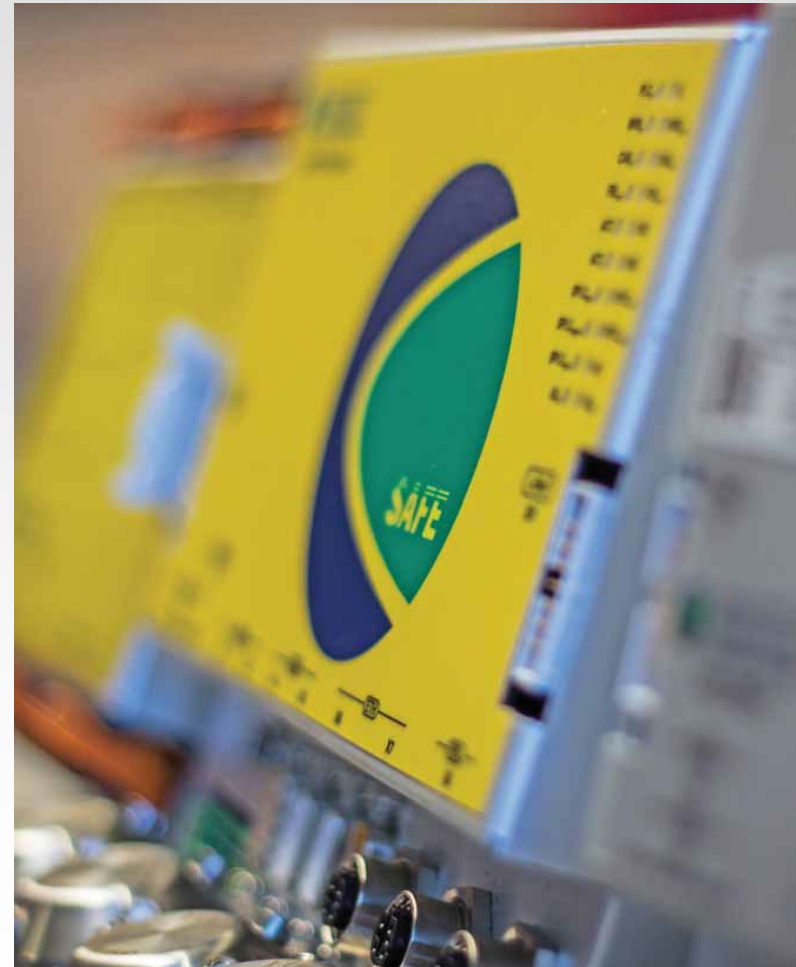
- Unproper materials
- Unproper maintenance
- Dirt
- Undefined cargo – passengers's personal effects, clothes etc.
- Absence of on board fire suppression systems

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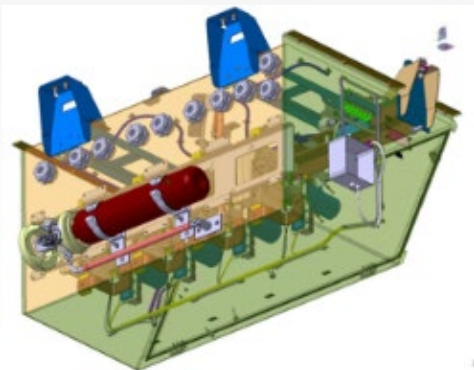
Rail Systems - Fire Detection Systems

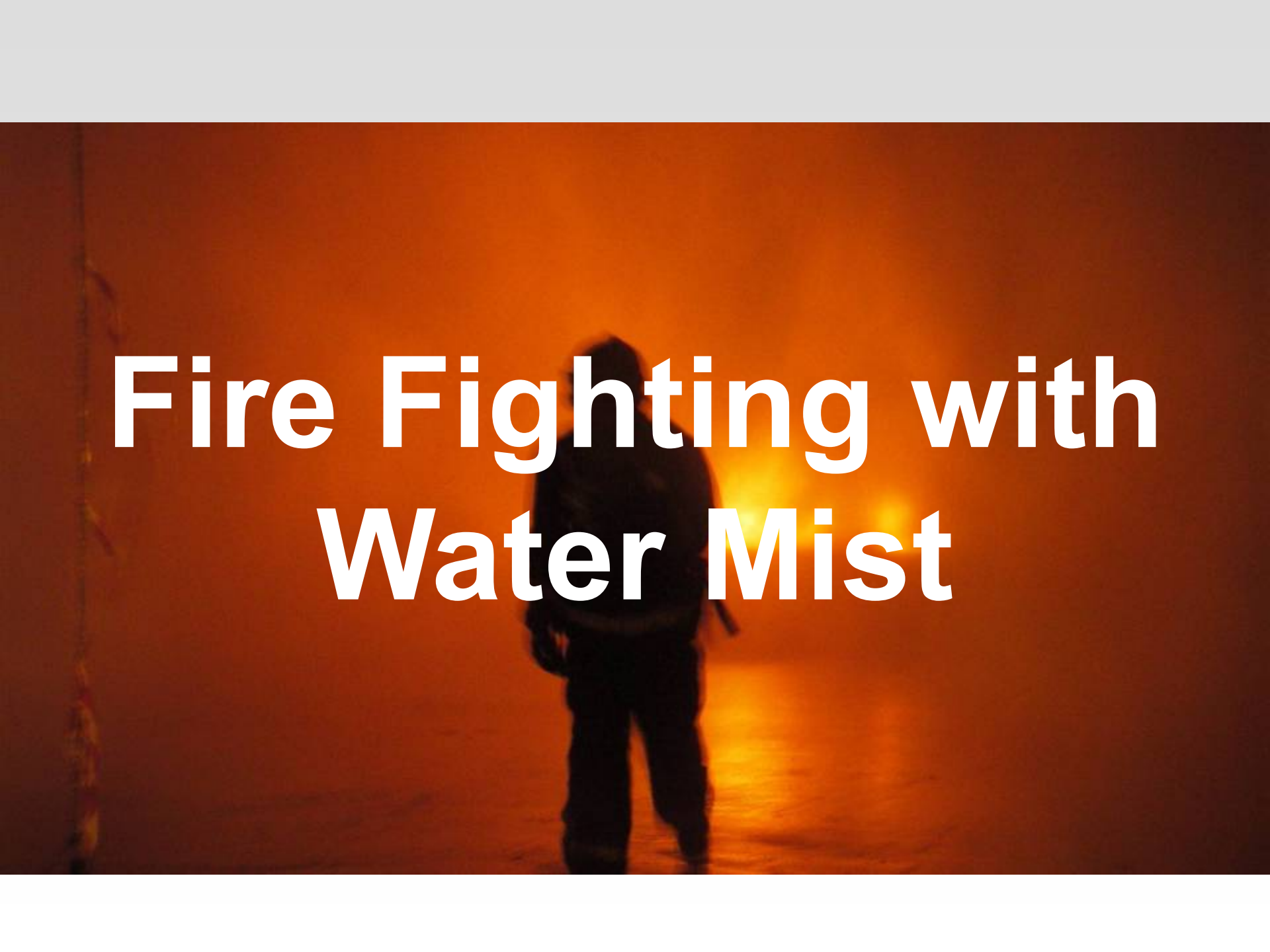
- Smoke Detectors
- Smoke Aspiration Systems
- Temperature Detectors
- Linear Heat Detectors
- Gas Sensors
- Communication Interfaces



Rail Systems – Fire Fighting Systems

- Gas Systems (Nitrogen)
- Aerosol Systems
- Water Mist Systems
- Combinations



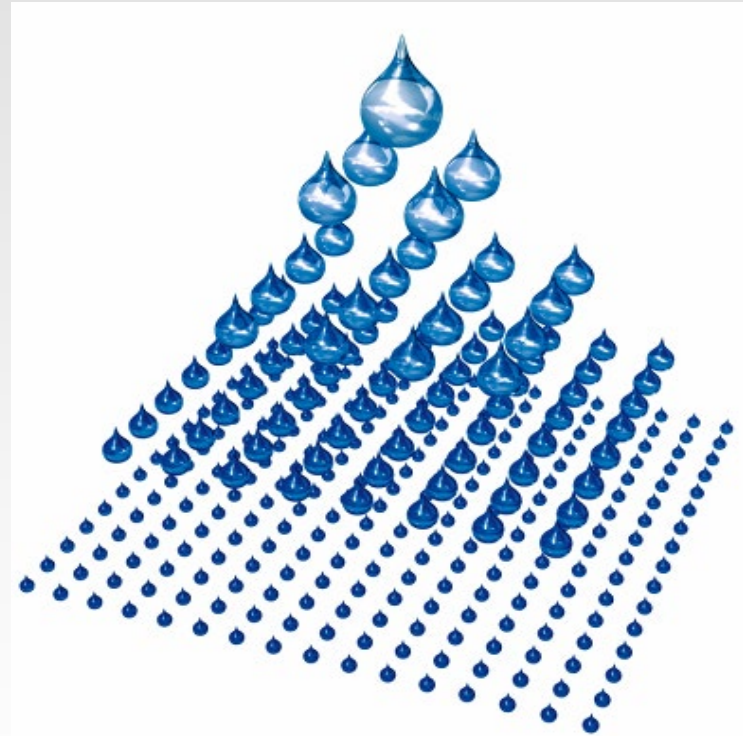
A firefighter in full protective gear is silhouetted against a bright, intense orange and yellow fire. The firefighter is standing in the center, facing the fire. The scene is filled with thick smoke, creating a hazy, atmospheric effect. The fire is the primary light source, casting a strong glow on the firefighter and the surrounding smoke.

Fire Fighting with Water Mist

Technology – Small Droplets - Big Effect

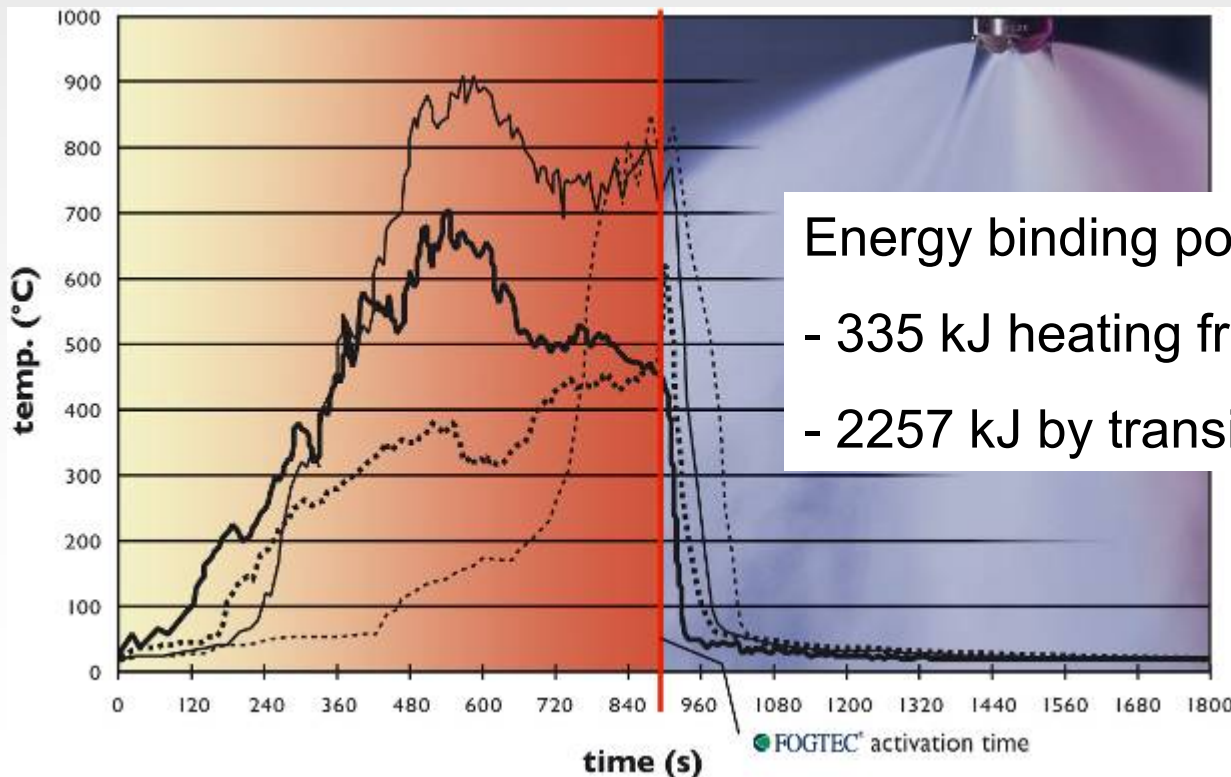
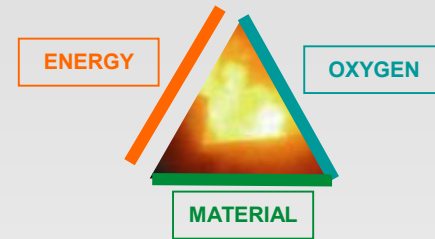
- Cooling by heat absorbption via large surface
- Inerting by local oxygen displacement

Droplet Diameter		Reaction surface per litre of water
1mm	⇒	2m ² (Convent. Technologies)
0,1mm	⇒	20m ²
0,01 mm	⇒	200m ² (FOGTEC Water Mist)



Technology – Cooling / Radiant Heat Attenuation

- Safe environment for people
- Protection of nearby objects from radiant heat
- Prevention from flash over



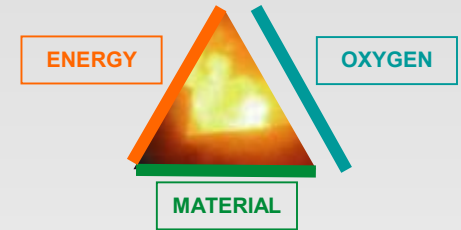
Energy binding potential of 1 l of water:

- 335 kJ heating from 20°C to 100°C
- 2257 kJ by transition from liquid to gas

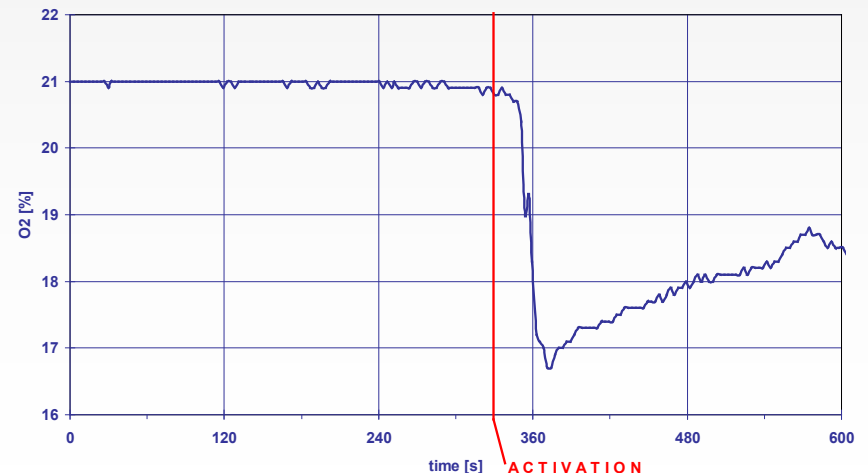
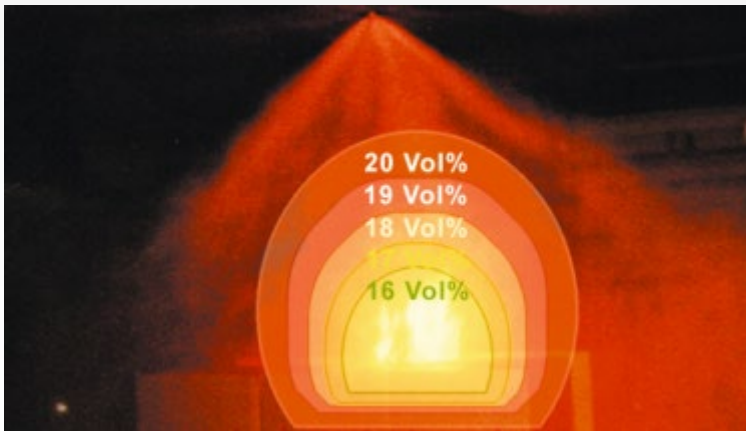
Technology – Inerting by Local Oxygen Displacement

„Suffocation“ of the fire by displacement of oxygen at the fire source

Volume enlargement of 1 litre of water by evaporation:
1 l, liquid $\Rightarrow$ 1650 l, gaseous



Oxygen reduction only at the source of the fire



Technology – Absorption of Smoke

- Binding of smoke particles by small droplets
- Washing out of gases (e.g. HCL) via huge reaction surface
- Less contamination by smoke



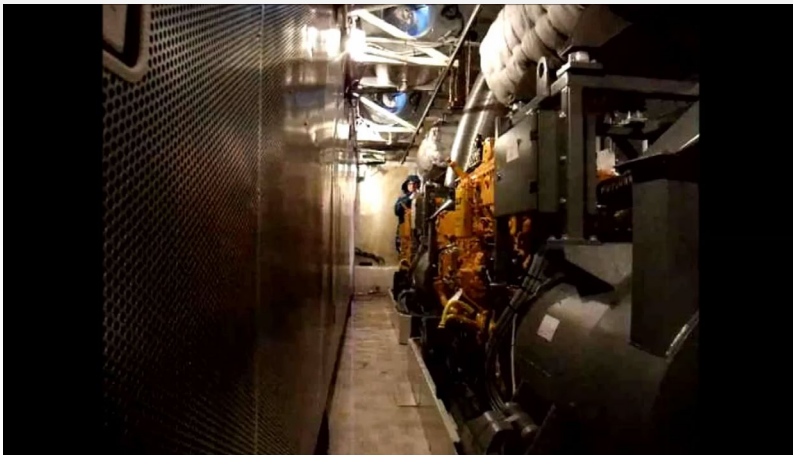
Technology – System Benefits

- Safe for personnel / No pre-warning time required
- Effective fire fighting / Reach of hidden fires
- Rapid and uniform cooling of hot surfaces and surrounding areas / No re-ignitions
- Negligible effect on electronic and electrical components
- Minimal water consumption
- Minimal business interruption
- Easy installation / Retrofit with small bore pipes as room protection

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Example videos



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Thank you very much for your kind attention !

