

# HI-FOG® Water Mist Fire Protection System

## Pop-out Solutions for Rolling Stock

### PART 1



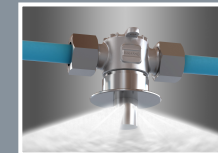
Marioff Group

### PART 2



METRO project

### PART 3



HI-FOG®  
Pop-out solutions

**Railway Interiors 2011**

**Mr. Petteri Valkohaapa**  
Manager, Stations & Rolling Stock  
Marketing & Business Development

16.11.2011

## Marioff Group business

- **Activity** Fire protection system manufacturer and supplier
- **Product** HI-FOG® Water Mist Fire Protection System
- **Mission** Protecting people, property & business continuity from fire
- **Core benefits** Reduced fire, smoke and water damage  
Minimal business interruption  
Environmentally friendly

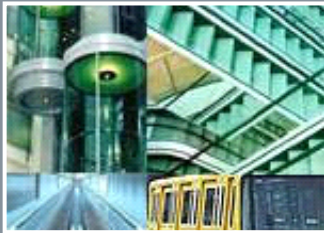
Headquarters, Vantaa, Finland



## Marioff Group

### Part of United Technologies Corporation

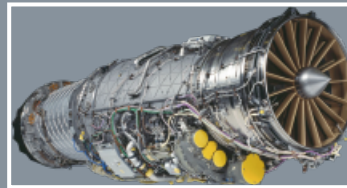
- USD 52.9 billion sales
- 206,700 employees
- Operating in more than 4,000 locations in approximately 70 countries; UTC does business in approximately 180 countries



Otis  
Elevators, escalators



Carrier  
Heating, air -conditioning



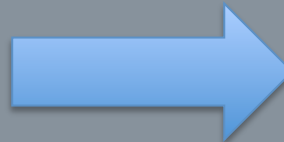
Pratt & Whitney  
Aircraft engines



Sikorsky  
Helicopters



Hamilton Sundstrand  
Aerospace, industrial



UTC Fire & Security  
Fire safety, security solutions



UTC Power  
Power systems, fuel cells

## The METRO project (Sweden, 2009 – 2012)



## Carried fire load on-board

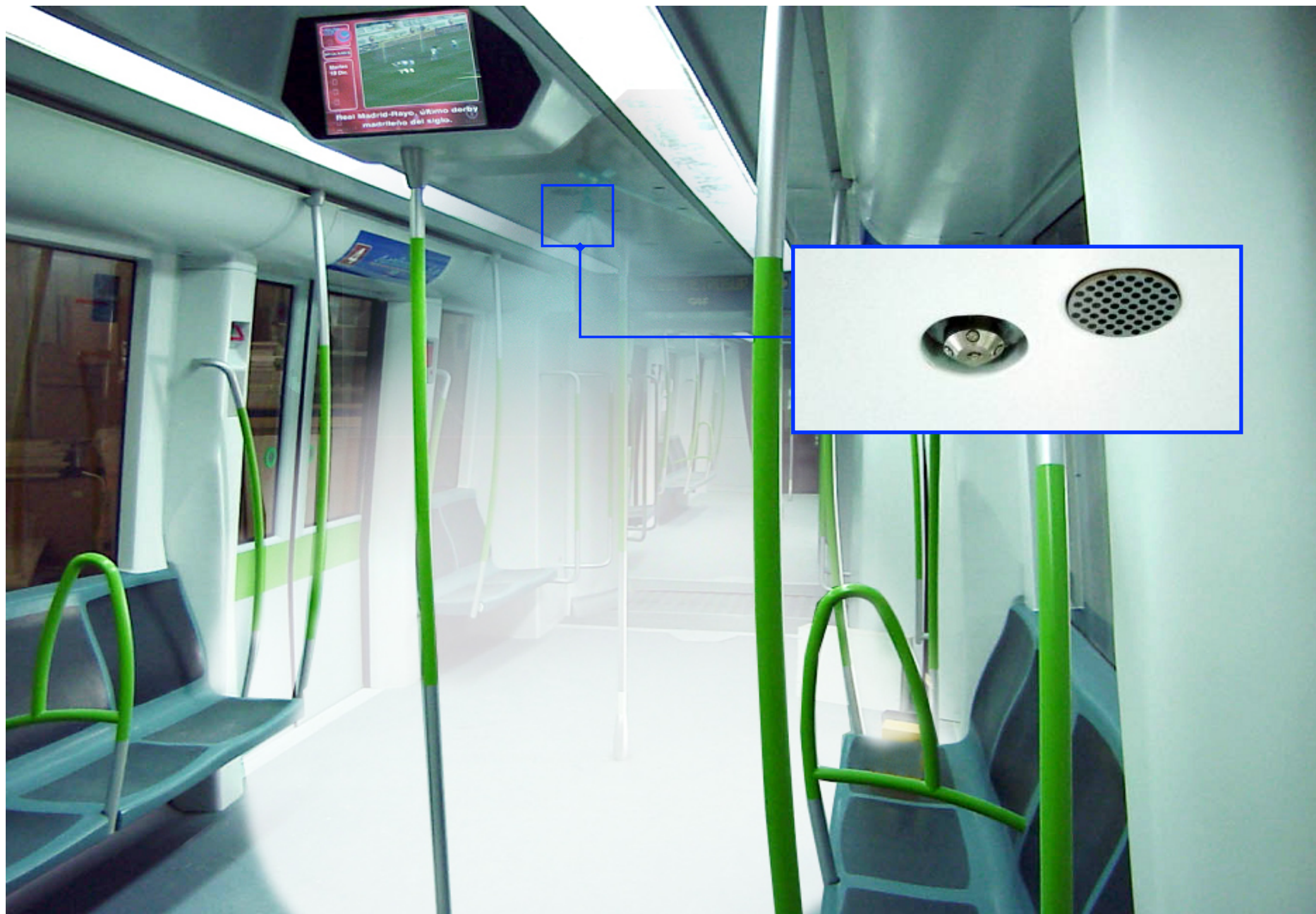
- Field study in 2010 and fire tests made for METRO-project lead by Mia Kumm from Mälardalen University, Sweden
- Mean weight of a passenger luggage was 4.2 kg in Stockholm metro
  - 82 % of passengers carried some type of luggage
  - 28 % of passengers carried some type of pressurized can
- → For a metro train with 1,200 passengers it means an extra 4,133 kg of combustible material, equivalent to 85 GJ
- ≈ around 50 % extra fire load **PV: NORMALLY FORGOTTEN**



## METRO full-scale fire tests observable results

- Final report is expected in March 2013, this information is based on the METRO-seminar on 13-14.9.2011 in Sweden
- Two fire tests with different interiors materials, of 1970s and of 2010s
- Ignition source was few liters of gasoline/diesel and the luggage of passengers
- → With 1970s interiors it took **only 3 minutes** to flashover...
- → With 2010s interiors it took **over 1 hour** to flashover...

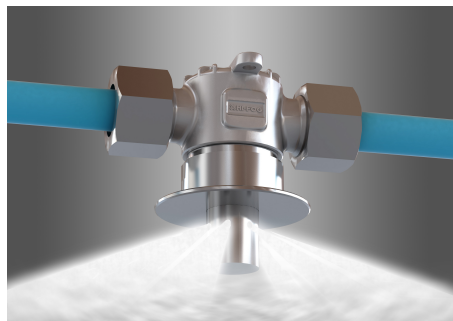
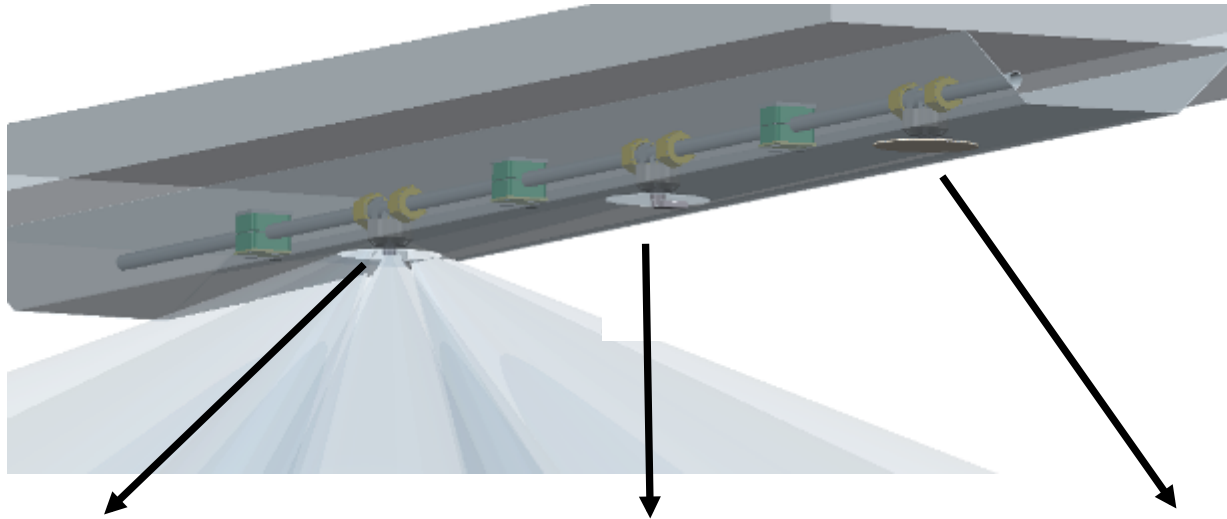
**WITHOUT LUGGAGE THE FIRE DID NOT HAVE A FLASHOVER EVEN IN THE OLD CARRIAGES OF 1970s, BUT WITH THE LUGGAGES IT DID (EVENTUALLY) EVEN IN THE MODERN CARRIAGES OF 2010s...**



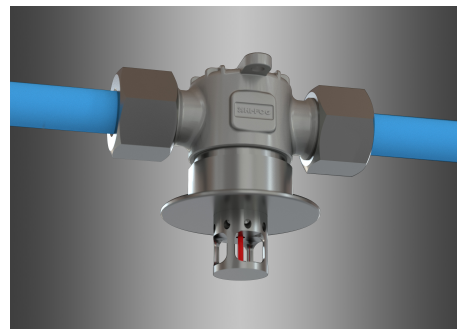


## HI-FOG® Innovation

*New HI-FOG® pop-out sprinkler head*



**Activation position**



**Pre-activation position**

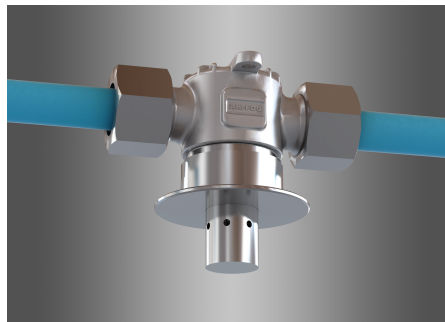
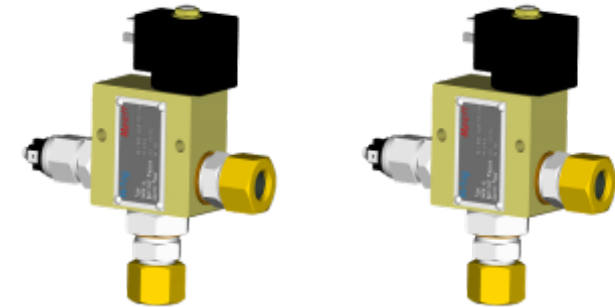


**Stand-by position**

## Pop-out spray head system

### *Advantages of zone protection solution:*

- Rapid suppression of the fire
- Effective reduction of smoke and heat
- Full control of system activation
- Improved aesthetics
- Reduced risk of vandalism





## HI-FOG® Rolling Stock References (1/2)

### Madrid Metro

- 226 trains today, over 1,300 carriages
- 286 trains by 2011 (since 2000)
- 3 manufacturers
- Target: passenger areas, drivers' cabins
- System: Train protection (Compact GPU)



### Daegu Monorail

- 28 trains, 84 carriages (by 2014)
- Target: passenger areas
- System: Train protection (Cylinder Units)
  - detection system from Consilium



## HI-FOG® Rolling Stock References (2/2)



### International high-speed train (Europe)

- 50 trains (2011 – 2017)
- Target: passenger areas
- System: Precision protection (pop-out sprinklers)
  - detection system
  - aerosols for technical areas

### Regional single deck DMU (Italy)

- 5 trains (2011 – 2012)
- Target: passenger areas, power pack, fuel tank
- System: Zone protection (pop-out spray heads)
  - detection system from Consilium
  - aerosols for technical areas

### Regional single deck EMU (Italy)

- 8 trains (2011 – 2012)
- Target: passenger areas
- System: Zone protection (pop-out spray heads)
  - detection system from Consilium
  - aerosols for technical areas

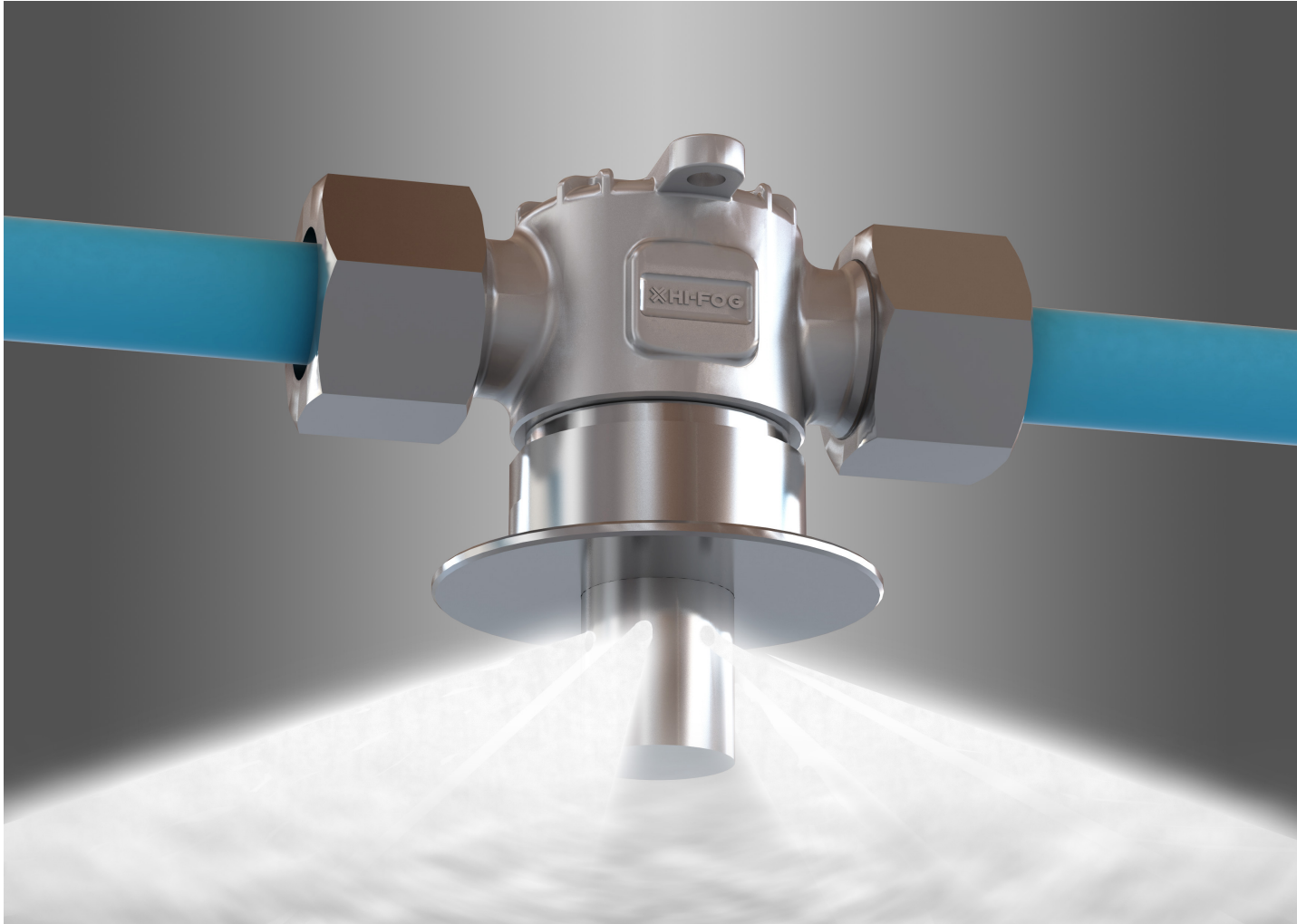
### Regional single deck EMU (Italy)

- 9 trains (2012 – 2013)
- Target: passenger areas
- System: Precision protection (pop-out sprinklers)

**Better to prevent this one from happening...?**



Then consider the "invisible" pop-out solutions...



## Speaker biography



**Mr. Petteri Valkohaapa**

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Marketing & Business Development

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**“Petteri Valkohaapa is Marketing and Business Development Manager of Marioff Corporation Oy, focusing global attention on promoting HI-FOG water mist systems for stations and rolling stock applications. Beyond marketing activities, he ensures optimized technical solutions are available for both segments.**

**Before joining Marioff in early 2009, Petteri worked for several years in various sales positions in electrical industry. Petteri gained his MSc. in Industrial Engineering and Management from Tampere University of Technology in 2010.”**