



FOGTEC[®] FIRE PROTECTION





**Improving the fire safety and preserve the investment
with small economical efforts by use of active fire
fighting systems**

Case study of a diesel locomotive



Contents of the presentation

- **Fogtec and Fogtec Rail Systems**
- **Fire detection solutions**
- **Fire extinguishment solutions**
- **Testing and validation**
- **The idea of compensation**
- **Economical feasibility**



FOGTEC Fire Protection, Cologne



Head Office in Cologne, Germany

R&D, Rostock, Germany

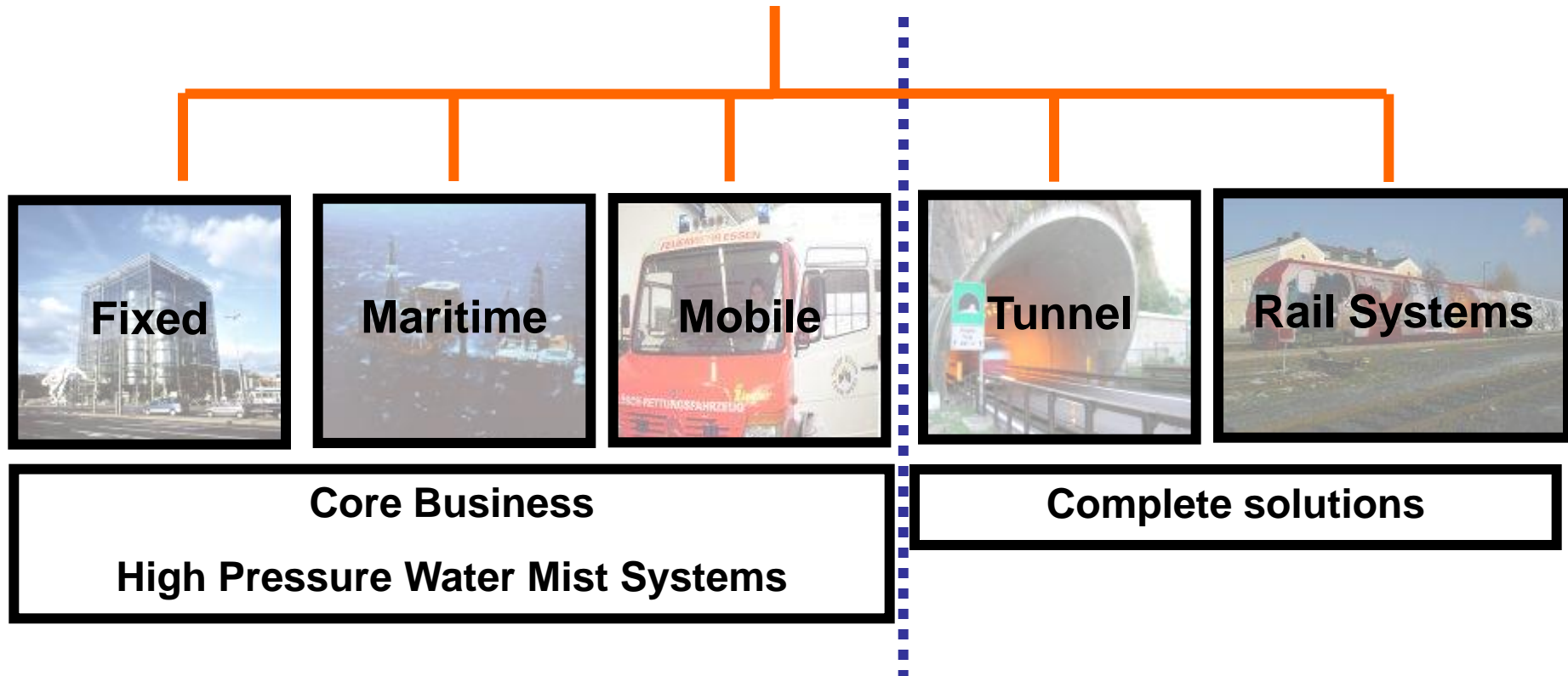
**Maritime Systems, Hamburg
Germany**

Office France, Paris

Office UK, Manchester

Office China, Shanghai, China

Office Asia, Mumbai, India





FOGTEC Rail Systems

Business Unit Rail Systems

Head Office in Cologne

Consulting work in regard to Fire Protection in Rolling Stock

Specialised on development and marketing for complete fire protection solutions in rolling stock applications

Fire detection / fire suppression

Add on products

Development and manufacturing of plug-and-play modules

Full Time Rolling Stock Team – 25 employees



Certifications



EN 15 085-2

Memberships





The Customers (Vehicle Manufacturer):

 **BOMBARDIER**

Talgo


FIREMA

STADLER
Cleverer Lösungen auf der Schiene

ALSTOM

SIEMENS

 Downer EDI
Rail

BOMBARDIER

 mermec group

VOITH

CAF

 Windhoff
Bahn- und Anlagentechnik GmbH

 pesa
Pojazdy Szynowe PESA
Bydgoszcz SA Holding



Ein Unternehmen von
ThyssenKrupp
Technologies

ThyssenKrupp Transrapid



International the number one





**UITP – Award
Most innovative
Product 2009**





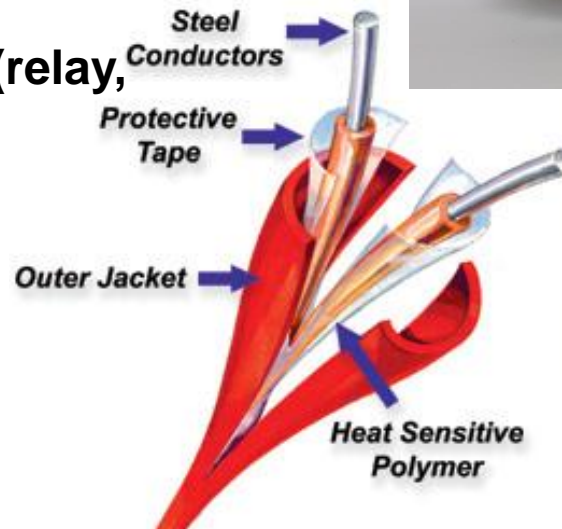
**Which technologies for protecting
our rolling stock?**



Fire Detection Technology

Linear Heat Detector (LHD)

- Simple and maintenance free product
- High reliability
- Easy installation
- Different interface standards (relay, CAN)
- EMC protected
- Safe and robust







Fire extinguishment technology

- High Pressure Water Mist



- Aerosol generators



FOGTEC[®] High Pressure Water Mist Systems

- Effective
- Environmental friendly
- Safe for people and properties
- No thermal shock on heated up surfaces
- No explosion risk on pool fires



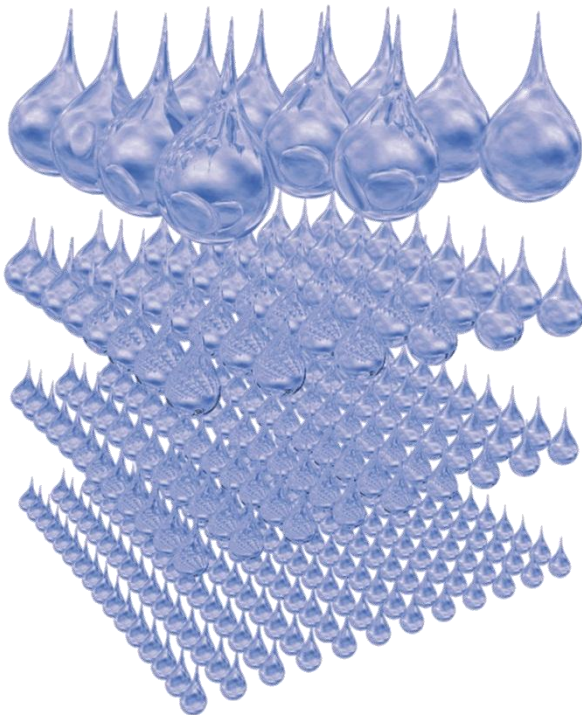


How does water mist work?

- **Cooling due to heat absorption by large water surface**
- **Inertization by local displacement of oxygen**
- **Cleaning of the involved area by absorption of smoke and ashes**



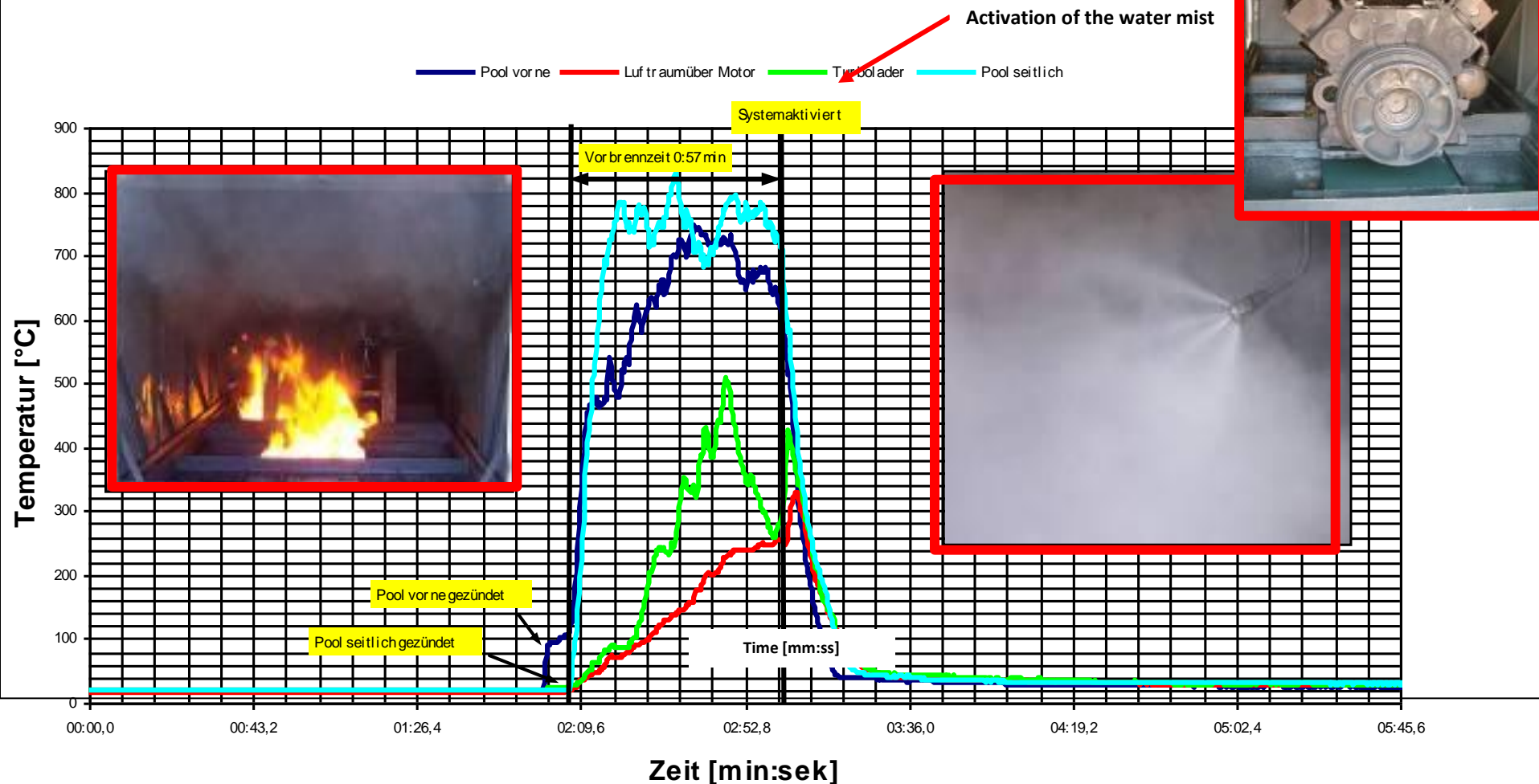
Large Heat absorbing surface



Diameter of droplet / μm	Reaction surface / m^2 / l
1000	2
100	20
10	200



Full scale fire test for engine compartments

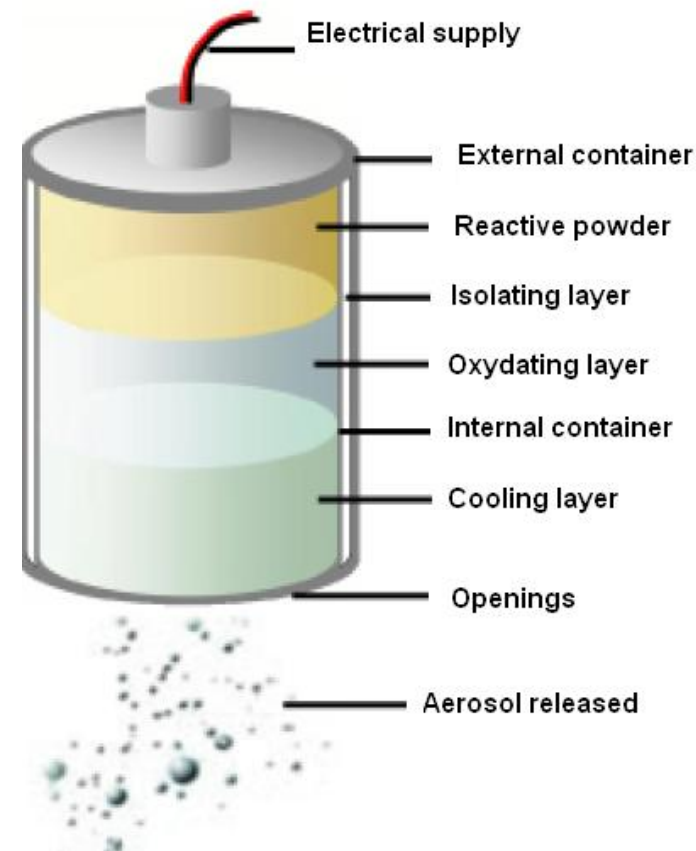




Aerosol generators

Potassium based dry agent

- Maintenance free
- Limited weight
- Robust
- No explosive firing
- Not corrosive
- Easy clean-up
- No environmental side-damage (GWP = 0)



- **Application only in areas where no people are attending!**





FOGTEC Rail Systems - Picture of the system





Testing, design and validation

- Based on the ARGE Directives

The ARGE Directives are three and give guidance specification for:

- assessing the fire detection systems;
- assessing the fire fighting systems;
- assessing the general functionality of the complete active fire protection system.

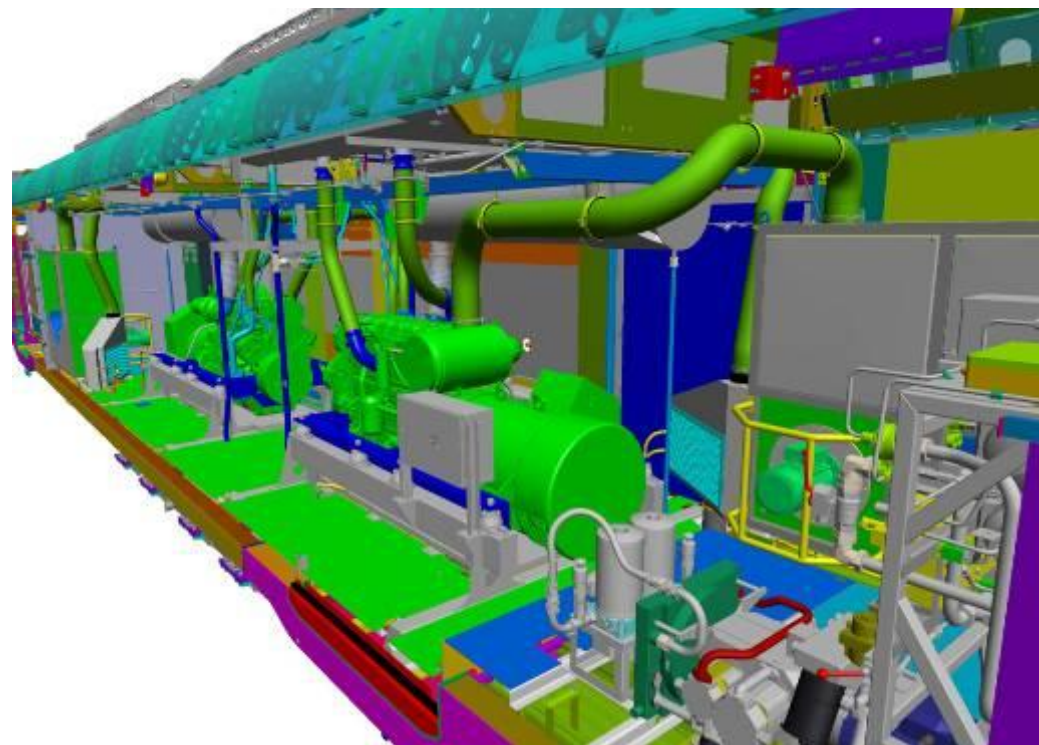
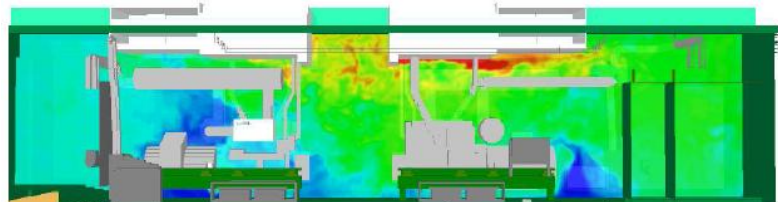
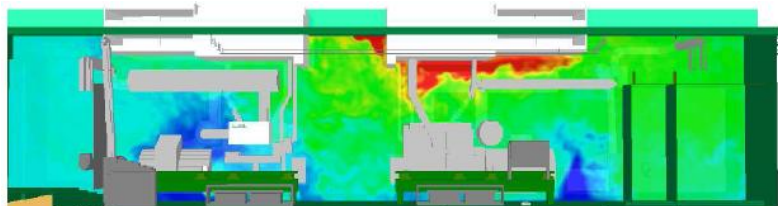
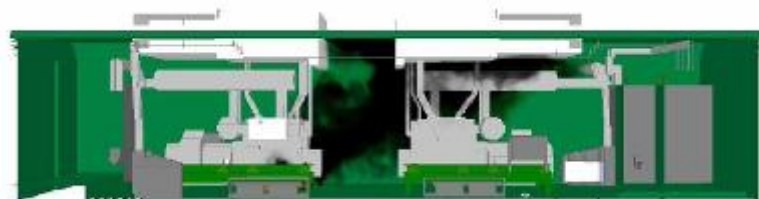


Testing, design and validation





FOGTEC Rail Systems – Evaluation of fire detection systems





The idea of compensation

- „Compensation“ of traditional passive fire protection solutions by using of active system

Many advantages are given by exploiting such possibility:

- Compensation of materials
- Compensation of fire barriers
- Compensation to infrastructure
- Compensation on vehicle design
- Possibility to increase up to the state-of-art of nowadays the safety level of existing rolling stock



The compensation in the regulatory framework

- Assessed by TUV Sud in 2008 by ist „Experts‘ report“
 - Finally introduced officially by teh last TSI „Conventional rolling stock“
- Compensation of fire barriers by equivalent „fire spreading prevention measures“
- TSI „Loc & Pass“, EU-Directive 57/2008/EC, released via the EU Commission Decision 291/2011/EC



The economical effectiveness

- In this moment of increasing costs for the railway industry, can such solution be competitive?
- Cost of a locomotive:
- 5 Billions € for a new one (EU)
 - 2 Billions € for a new one (USA)
 - ~ 1 Billion for a used/refurbished
- Investment to preserve!
 - The locomotive has to run: each day out of service causes heavy losses for the operator
 - A system based on the presented technologies can be placed in use in new/refurbished locomotive with less than 10K €



The economical effectiveness

- That means a small investment (in the fire protection system) to save potential heavier losses in future
- Similar consideration and similar technologies can be applied to all rolling stock:

- Electrical locomotives
- Diesel multiple units
- Electrical multiple units
- Passenger wagons
- Generator wagons
- Special machines (track working, track cleaning...)



**Thank you very
much for your kind
attention !**