



# The Smarter Way of Fire Fighting Rail Systems

# FOGTEC Rail Systems

## Fire protection for rolling stock

In the past, the focus of the rail industry in terms of fire protection was almost exclusively directed towards the technical properties of materials and design measures. Over the last few years, fire protection systems have become increasingly important. This represents a development from the emphasis on structural fire protection, which relies on designing a vehicle in such a way that it can withstand fire. Instead, the aim is the automatic detection and localisation of the fire followed by the appropriate action. Given the increasing risk assessment approach to rolling stock fire fighting systems can offer many advantages and can also prove to be a helpful tool in the approval process. This makes it easier even, in some cases, possible at all to comply with the demands set by new standards and directives. Issues of compensation and cross-border traffic are at the forefront. At the same time, the adoption of such systems can bring economic benefits to both the manufacturing and operating of rolling stock, resulting in reduced design costs as well as lower loss expectations and higher availability.

FOGTEC offers modules and complete systems for active fire protection that have been specially designed for use in rolling stock and that have also been tested or approved by the relevant authorities.

## Rolling Stock Capability

Some years ago FOGTEC set up its own specialist rolling stock division, Rail Systems, which is based on its extensive expertise in fire protection. The wide range of customised high pressure water mist technology solutions that FOGTEC had created for a number of different industries meant that it already had access to high quality components and a solution oriented team.

Today, FOGTEC, with its Rail Systems Team, is one of the leading providers of fire protection solutions for rolling stock. Its service portfolio includes full service solutions, from consultancy work, the supply of components and complete systems to the installation and maintenance of fire protection systems.

## Fire protection with FOGTEC Rail Systems

- **Reduced business interruption costs**
- **Greater availability of rolling stock**
- **Lower insurance costs**
- **More flexible construction**
- **Shorter implementation times**
- **Compliance with approval requirements**
- **Enabling of cross-border traffic**

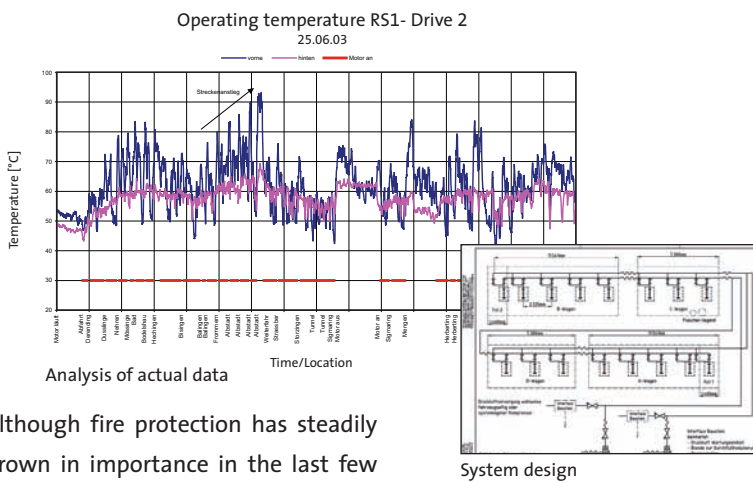


Rolling stock manufacturers and operators are able to obtain complete solutions from a single source. The same applies to the integration of fire protection solutions in new or existing rolling stock. FOGTEC is able to call on a team of experts from various specialist areas. Its railway engineers play a key role, working closely with other FOGTEC experts from the fields of fire protection, electrical and mechanical engineering, hydraulics, chemistry and programming. FOGTEC is able to complete the range of services it can offer thanks to a number of close, long-term partnerships with specialist companies in these industries.





# Fire protection - Consulting



Although fire protection has steadily grown in importance in the last few years, it often plays a secondary role with manufacturers and operators, mostly due to a lack of specialist resources. Yet fire protection requirements have a technical and above all economic impact on both manufacturers and operators. Even though fire protection is as important in terms of the approval

process as crash safety, fire protection experts tend to operate independently. When additional tasks arise, that go above and beyond the normal workscope, capacity is soon exhausted. If active fire protection is taken into consideration at an early stage of the overall design and construction process, greater savings can be made in terms of manufacturing and operating costs. The consultancy work offered by FOGTEC helps to identify and realise these potential savings. FOGTEC provides both day-to-day and specific project support. It supports the engineering phase of the development of new rolling stock as well as the co-ordination of larger processes such as refurbishment projects. Additional capacity can be provided to ease bottlenecks and to

ensure that fire protection issues are integrated in the process at an early stage.

## Consulting

- Analysis
- Concepts/Design
- Coordination
- Approval support
- Performance reviews

The consulting portfolio covers the analysis of international and national standards, the co-ordination and implementation of development and approval processes associated with fire protection, follow-up on material certification and the co-ordination of verification tests. These services are carried out independently of the supply of hardware.

Both manufacturers and operators are able to benefit from this involvement of FOGTEC employees in relevant research groups and standards committees and their close contact with approval authorities and certifiers. Not only does this ensure up-to-date knowledge of current standards and technologies but allows for preparations to be made ahead of any proposed changes in standards etc.



# Comprehensive fire protection solutions

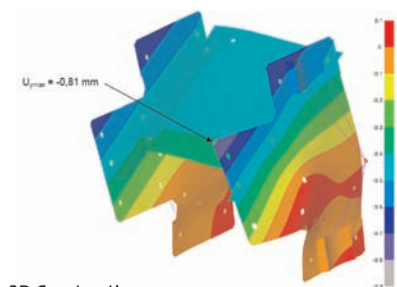
A comprehensive approach is crucial to ensure the successful implementation of all fire protection projects. The FOGTEC Rail Systems Team has established itself in the rolling stock industry by providing effective and economically viable system solutions.

The range of services offered covers all important elements of fire detection and fire fighting technology as well as additional products, all of them specifically designed for railway technology. This also covers such applications where more stringent demands need to be met (e.g. Safety Integrity Level).

## Fire protection solutions

- Own fire testing laboratories
- Co-operation with testing laboratories
- Climate testing facilities
- 3D / FEM analysis
- RAMS analysis
- DIN 6700 welding certification
- 24/7 service

A vehicle-specific concept is produced in co-operation with the client after making a thorough assessment of the basic situation, the relevant approval issues and the advantages and



disadvantages of individual solution approaches. Feasibility is constantly evaluated even at this early stage of the project. Throughout the design phase, components can be brought together and optimised in order to reduce assembly costs to a minimum. This is particularly relevant when it comes to the integration of fire protection components in other assembly groups and their interaction with each other. Integration into the relevant manufacturing process is carried out in close co-operation with the client.

Constant tests are run concerning the dimensions of the systems with regard to installation tests and possible misalignment. This applies to individual parts, modules and pipeworks as well as the central system units.

Extinguishing agent cylinders can be built into pre-assembled modules. Control cabinets and support modules can be designed for underfloor or ceiling construction or as an integral element of the passenger area or the engine or control room. The construction and manufacturing process takes all relevant standards into account and these are then guaranteed by means of welding certification in accordance with DIN 6700 as well as through the rotational inspection of specialist welders by the German Welding Institute (SLV).



Installation during ongoing production

The latest 3D programmes and FEM simulation are available to help with construction, calculations and planning. To ensure accurate communication between plant specific components and the rolling stock control unit, specific communications protocol and signalling methods are prepared in close co-operation with the client.

Throughout the course of the project FOGTEC specialists support the installation, commissioning, type testing and general service requirements when requested to do so by the vehicle manufacturer or operator.





# Fire detection systems

Where required as part of the approval process, real fire tests can be carried out in the FOGTEC laboratories or smoke tests can be run in the actual vehicles. These tests provide the necessary evidence for the positioning of fire detectors elements in different circumstances. This work is carried out on a regular basis in close co-operation with certifiers and authorities.

## Custom solutions

Effective fire fighting is based on effective fire detection. FOGTEC offers both standardised fire detection modules and tailored systems to individual circumstances. Simple and economic monitoring solutions can be put in place as well as more challenging solutions for such applications as SIL 1. System components such as smoke detectors, point and linear heat detectors, smoke aspirating systems and fire detection panels are available in a variety of technical designs.



## Product family 1000

The components of the 1000 series were developed from low cost production of building services engineering, modified to suit the demands of rolling stock. The focus lies on cost optimisation in applications where demand is low in terms of sensitivity, verification and durability. Typical areas of application include the monitoring of areas with individually localised risks (WC cubicles, Power-Pack, ...), which have low requirements in terms of technical flexibility.

## Product family 3000

The 3000 series covers technically more complex solutions for monitoring entire carriages or trains. A central interface is available for railway control and communication technology. This ensures high availability, a low failure rate and great flexibility in terms of system design. Later system modifications can be made without the need for new software processing. An RS232-interface is available for diagnostic and service work.



Fire detection systems

## Product family 9000

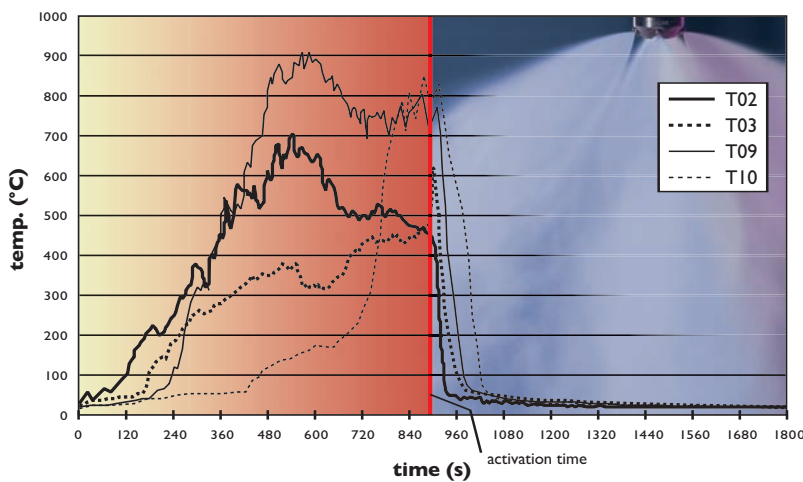
The 9000 series represents the top end of the product range. The individual elements, which communicate via an integral CANbus, provide a high degree of reliability and flexibility. Both components and software are suitable for SIL certification. The systems are also very small in terms of installation dimensions, light weight and have minimal power requirements.

# Fire fighting

The installation of fire fighting systems has been proved to bring about a significant reduction in direct and indirect losses. Safety levels can be greatly improved for both operators and customers. In the long term this has a positive impact on rolling stock availability and on the company balance sheet. Depending on the risk levels involved, the requirements in terms of fire protection and the installation space available, FOGTEC can offer a range of

quickly absorb energy from the fire. The systems can be used, for example, to protect drivers cabs, low and high voltage switchgear cabinets, control boxes and diesel units in underfloor areas or engine cavities or to protect generators. FOGTEC high pressure water mist systems offer special protection for passenger areas. Unlike gas extinguishing systems, there is no need for pre-warning period and open doors or windows do not jeopardise the effectiveness of the operation.

phase). The reduced installation dimensions and the small pipework diameter means that costs are also kept to a minimum, even in retrofit projects. As only very small quantities of the extinguishing agent are used, not much storage space is required and weight is kept to a minimum. The systems are ideal to be integrated into rolling stock and are noted for their low life cycle costs and high levels of reliability.



## Gas extinguishing systems

For smaller electrical equipment or control cabinets it is possible to use compact gas extinguishing systems. These small installations have very few components and can often be integrated into the control cabinets. Nitrogen is normally used, since unlike chemical agents these work without leaving residues.

## Combined solutions

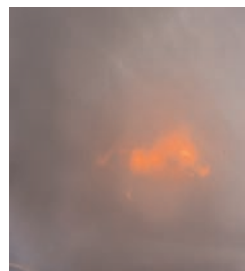
In rolling stock where both passenger carriages and such items as closed control cabinets form part of the fire protection risk, combined solutions using both system types can be installed.

fire fighting technologies, in particular FOGTEC high pressure water mist and nitrogen systems. To prove their suitability, most systems are subjected to full-scale fire tests in the FOGTEC laboratories.

## FOGTEC high pressure water mist

FOGTEC high pressure water mist systems are characterised by their highly efficient cooling effect. In case of fire, the extinguishing agent is atomised to a fine mist by being forced at high pressure through special nozzles in the affected area. The huge surface area of the innumerable tiny droplets is able to

Their suitability as compensation measures was proved in comprehensive independent tests in which many full scale fire tests were carried out. In vehicles requiring more advanced fire protection it was possible to replace fire doors, to reduce the amount of fire protection material needed and to simplify the verification procedure (such as calculating resistance in the main fire



# Applications and references

FOGTEC system solutions can be found in the most different applications in a multitude of vehicle types and concepts. In most cases, the areas where these systems are installed can be categorised as follows:

- Engine rooms (diesel and electric locomotives)
- Passenger carriages (local transport trains, mainline passenger cars, sleeper cars,...)
- DMU's (PowerPacks, generators,...)
- Control boxes (high, medium and low voltage)
- Hydraulic equipment (track construction machinery, special vehicles)



# FOGTEC Rail Systems, Competence in rolling stock

## FOGTEC products

- Greater availability
- More flexible construction
- Compliance with approval requirements
- Enabling of cross-border traffic

## FOGEC services

- Analysis / Construction
- Supply of Components
- Installation
- Own fire laboratories
- Approval / Certification
- 24/7 service



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