Experts in Fire Protection

Warszawa, 25.06.2014

Modern Trends of Fire Protection in Rolling Stock

Fire Protection Solutions from one source

FOGTEC Rail Systems

Rolling Stock Applications
Modern Trends of Fire Protection in Rolling Stock
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From concept design to validation and verification: case study of a modern and integrated fire protection system for application on rolling stock

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## Contents

- Introduction
- Concept design
- Detail design
- System validation and homologation according to railway standards
- Conclusions
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- Concept design
- Detail design
- System validation and homologation according to railway standards
- Conclusions
FOGTEC Rail Systems – Track guided vehicles
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Experts in Fire Protection
<table>
<thead>
<tr>
<th>Applications – Examples of References</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Speed</strong></td>
</tr>
<tr>
<td><strong>Intercity</strong></td>
</tr>
<tr>
<td><strong>Regional</strong></td>
</tr>
<tr>
<td><strong>DoubleDeck</strong></td>
</tr>
<tr>
<td><strong>Special</strong></td>
</tr>
</tbody>
</table>

- **High Speed**
  - Various high-speed trains from different companies and regions.
- **Intercity**
  - Intercity trains with different designs and color schemes.
- **Regional**
  - Regional trains adapted for local and regional services.
- **DoubleDeck**
  - Double-deck trains that maximize passenger capacity.
- **Special**
  - Specialized trains for specific purposes such as goods transport or maintenance.
## Applications – Examples of References

<table>
<thead>
<tr>
<th>E-Locos</th>
<th>D-Locos</th>
<th>Metro</th>
<th>Light Rail</th>
<th>Monorail</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="E-Locos" /></td>
<td><img src="image2.png" alt="D-Locos" /></td>
<td><img src="image3.png" alt="Metro" /></td>
<td><img src="image4.png" alt="Light Rail" /></td>
<td><img src="image5.png" alt="Monorail" /></td>
</tr>
</tbody>
</table>

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Introduction

From concept to verification and homologation

A jump in the life of the designer of modern fire protection systems

which tasks, which challenges, which criteria are given and must be followed to realize a modern active fire protection system for rolling stock application?
- Introduction
- Concept design
- Detail design
- System validation and homologation according to railway standards
- Conclusions
## Concept design

**Bringing customer’s requirements and input data to the white paper**

A very undetermined definition: depends on input data!

→ The very first skill required to the designer: smartness to identify which input data are necessary for the concept design
Concept design - example

Fire detection system for double-deck passenger coach

Requirements:
- smoke detection system for passenger areas and vestibules
- Information about system status at driver’s desk
- preference for a system which can ensure easier maintenance and lower life cycle costs

→ The very first skill required to the designer: smartness to identify which input data are necessary for the concept design
→ “Understand” the requirements
Concept design - example

- Independent system with its own CPU in each coach
- Point smoke detectors as detection technology
- Bus-based system logic
Concept design

Limits of the concept design:
- it is not precise
- it lacks of integration details
- It lacks of a finalized bill of materials
- Probably the software specification is not yet set, and all system detail functionalities are not defined

But it is the first step for the designer, the sales manager, the consultant, who wants to put on paper the idea his customer is asking him to provide
- Introduction
- Concept design
- **Detail design**
- System validation and homologation according to railway standards
- Conclusions
Detail design

How can we incorporate our concept onto a feasible and working system?

• Detail layout of the detection system, with definition of the detection time;
• Calculation for the amount of extinguishing agent to be stored;
• Analysis of available spaces and installation areas;
• Definition of the monitoring performances and of the interface communication with the TMCS
• Finalization of a bill of materials
Detail design - Example

Fire protections system for a converter box

- Position and type of LHD
- Quantity and position of aerosol generators
- Type of control unit and interface with train
Modern Trends of Fire Protection in Rolling Stock

- Introduction
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- Conclusions
System validation and homologation

The acceptance and homologation is just the summit of a process which must ensure that:

• The technical requirements set are fulfilled
• The design performances are met too
• COTS used have gone through proper testing and certification to verify their rail-worthiness
• The development of new parts is fault-free and the parts fully reflect their specifications
• The system and software engineering have been done properly to ensure that functionality of the whole system is according to requirements
System validation and homologation - example

Complete fire protection system for a DMU

According to the quality processes adopted by international standards like ISO and IRIS, we can set following milestones of the process:
• Type test A, for the components
• Type test B, for the system design
• Verification of the first installed system and hand out to customer
System validation and homologation - example

Type test A example: FEM analysis of cylinder frame

Type test B example: smoke tests

→ Commissioning
- Introduction
- Concept design
- Detail design
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- Conclusions
Conclusions

- A major knowledge and experience of the designer will help understand the requirements
- The designer must also have a holistic approach to the concept, watching beyond the crude requirements and being able to pick the right solution out of several;
- The choice of the components based not just on their function, but also on their rail-worthiness;
- Installation is a very challenging task that needs expertise and accuracy;
- A proper system validation and verification according to railway standards ensures, beside the an effective and fault-free operation, the successful homologation process;
- For the homologation process, the importance of proper documentation is vital
Thank you very much for your kind attention!