The Train Now Arriving At...
Harmonised Fire Safety For European Rolling Stock

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Introduction
Construction industry have recent history of using same fire test methods across Europe (Debbie Smith: CPD to CPR)

Rail industry less progressed. Currently, many different national test methods used across Europe.

Trains move across borders → highlights need for interoperability.

Example: Materials on Eurostar train must meet both UK and French standards.

Aim of harmonised fire safety across the European rail industry:

• Reduce barriers to trade
• Common approach to safety across Europe
Harmonised fire safety for European rolling stock to be provided by use of:
- Same test methods
- Same pass / fail criteria (i.e. national regulators can’t set national limits)

European Commission regulators mandated European Committee for Standardisation (CEN) to create technical standard for this purpose (Peter Mason: regulators = ‘customer’)

Exova Warringtonfire, an accredited fire test laboratory, has been represented and active in the relevant CEN and BSI committees

Fire safety in rail industry is complex → series of standards required: EN 45545

This presentation focuses on the development of just one part of this technical standard series: EN 45545 Part 2 (reaction to fire requirements for materials being used on trains)

NB. From this point, EN 45545 Part 2, will be referred to as ‘The Technical Standard’
The Train Now Arriving At...
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Analogy For Some Important Milestones On The Journey, Reached With The Support Of Accredited Test Laboratories
Analogy

A scenic journey = Interesting studies finding appropriate fire safety assessment
Accredited Test Laboratories Within Expert Groups To Conduct Pioneering Work

Exova Warringtonfire, an accredited test laboratory, have had the opportunity to be part of pioneering work:

- We have actively worked on the committees responsible for the development of ‘The Technical Standard’
- We have led and been partners in a number of research programmes to develop ‘The Technical Standard’

Development of ‘The Technical Standard’ is possible due to:

- European experts working together: ACCREDITED TEST LABORATORIES, regulators, train operators, train builders, material manufacturers, etc
- Significant funding by the European Commission, industry groups and individual organisations (including Exova Warringtonfire)

Wealth of expertise in Europe + Commitment to task = Significant developments → other standards organisations outside of Europe follow with interest
Analogy: Important Factors Relating To The Journey
Analogy

A long process, with uphill challenges

= First joint working group responsible for this task was formed in 1991
Starting Position For European Technical Standard
→ Completely Different National Test Methods & Criteria
Regulators request for harmonised fire safety on European rolling stock → huge task

Initially, needed to understand the merits and drawbacks of current national methods

Where appropriate, established methods would be selected for European system.

3 year pre-normative research project: FIRESTARR (1997 – 2001)

FIRESTARR considered test methods available to access

F lame spread
I gnitibility
R ate of heat release
S moke
T oxicity
Tested 80 products (structural, furniture and electrical) to standard small-scale fire tests

Also performed large-scale tests on 30 wall & ceiling linings, seats & bedding and electro technical products

Determined realistic reaction to fire tests and performance criteria for main product sectors on European railway vehicles

Demonstrated a need for innovative test(s) for:
- Assessment of toxicity
- Assessment of flammability of seat

Development of the innovative tests was outside of the scope of the FIRESTARR project. Innovative tests take time to develop and validate.
Analogy: Important Factors Relating To The Journey
| Delays due to leaves on the track | = Specific technical issues have caused significant delays, originally no one expected this to span three decades!!! |
One Size Must Fit All

It’s not as simple as it sounds!

High impact regulation change

Having the same test methods is a challenge

Having the same pass / fail criteria for all countries leads to even more difficulties

Different countries have different unique situations (example: The 19th century infrastructure of London Underground has hazards not faced by other rail systems such as deep tunnels, no side evacuation, non-compliant means of escape, etc.)

The standard needed to consider the various designs and operations of each country
Working Towards ‘The Technical Standard’

2009: **CEN/TS 45545** Part 2 published, the culmination of 18 years work

CEN/TS = Technical Specification as opposed to European Standard

A Technical Specification document is not as advanced as a European Standard

‘The Technical Standard’ we have been mandated to produce should have European Standard status

Enquiry conducted to gather comments on CEN/TS 45545-2 document → 74 ‘leaves’ (pages) of comments!
Analogy: Important Factors Relating To The Journey
The train is now arriving at the station... = In February 2013 we anticipate the publication of Edition 1 of ‘The Technical Standard’...
Analogy

| ... please mind the gap between the train and the platform | = | ...We are still some years away from harmonisation, at least 2016. Edition 1 of ‘The Technical Standard’ will have technical issues which need addressing. |

**MIND THE GAP**
Recall: 74 ‘leaves’ of comments relating to CEN/TS 45545-2

Ideally, all comments should be addressed before advancing the document to European standard status

When work began to review the comments in 2011, it was apparent there was not enough time to consider all comments

Due to time constraints no significant technical issues would be addressed before publication of Edition 1 of ‘The Technical Standard’.

Significant technical issues include improvement and validation of the innovative tests developed for:
  • Toxicity assessment
  • Seat flammability assessment
European Commission funded TRANSFEU project is working to develop this test

Aim: Small scale test to assess toxicity threat from materials in the event of a fire

Current toxicity test - Provides an arbitrary result for ranking only

Future toxicity test developed by TRANSFEU - Using state of the art technology, fire engineering and understanding of toxicity effects, the test provides a result has a real life meaning
Need to Improve Seat Flammability Test

• UK currently have high levels of material fire safety requirements.

• UK rail industry needed to satisfy themselves that changing from current UK requirements to the proposed European requirements would provide equivalent safety.

• Rail Safety and Standards Board (RSSB) project compared current UK requirements (BS 6853) and proposed European requirements (CEN/TS 45545-2).
UK result: Fail, seat cannot be used on any train
European result: Can be used on all trains, including underground trains
Seats trim (limited surface) - Flammability
Comparison of Specifications: Seats

Seats of upmost importance:

- Significant surface area / volume within the carriage
- Likelihood of the fire scenario involving seat (vandalisation)

RSSB project confirms need for:

- Further development of seat flammability test (repeatability & reproducibility)
- Investigation of appropriate fire safety requirements
Bridging the Gap Between The Station And The Platform

The significant technical matters are well known → extended period for the withdrawal of national standards (3 years rather than the normal 6 months)

European experts must continue to work together to revise Edition 1 of ‘The Technical Standard’ before it’s use is mandatory (see above, ~3 years)

Once the revision is complete, this can become Edition 2 of ‘The Technical Standard’ and the gap will be bridged

The next three years will be a difficult period for ACCREDITED LABORATORIES, train builders, material manufacturers, etc.

• As an accredited test laboratory, Exova Warringtonfire must work against numerous standards each which requires different expensive equipment and time consuming setup.
• In parallel to standard testing, Exova Warringtonfire are committed to conducting research towards the development of a robust Edition 2 of ‘The Technical Standard’
Analogy: Important Factors Relating To The Journey
Can we do better than arrive at the station platform, can we get to the door of the final destination?  

=  
Mandated task complete, but, regulations & ‘The Technical Standard’ can have further success if supported by other initiatives
Extending The Success Of The Regulation

The success of the regulation can be extended further:

- Ongoing review and improvement of technical standard
- Policing of harmonisation
- Further industry harmonisation
- Increased laboratory correlation checks supporting ISO 17025 accreditation (Brian Bowsher: measurement standards & round robin exercises and Paul Stennett / Lorraine Turner: UKAS)
- Inspecting and certification (Phil Owen: Market surveillance and Drewin Nieuwenhaus: Testing-Inspecting-Certification)
Further Industry Harmonisation:
Fires Happen On Land.... ....And Sea
Further Industry Harmonisation: Consider Differences Such As Evacuation
Further Industry Harmonisation
Consider similarities such as material choice
Rail and Marine

Rail and marine fire safety standard committees can and are starting to work more closely.

TRANSFEU project considers toxicity threat in all surface transport. The International Maritime Organisation (IMO) await TRANSFEU project completion prior to reviewing their IMO toxicity test.
Increased Laboratory Correlation Checks: Standard Materials and Round Robins

Fire tests are notoriously variable, for many tests the repeatability and reproducibility are surprising to those not in the industry.

This variability of the test methods mean that an outlier laboratory is not always obvious.

Laboratory performance needs to proven, suggestions are:

• Use of standard materials in calibration procedures

• France operate a mandatory, well established, independently run round robin scheme for laboratories testing against French national rolling stock standard. Testing must be conducted at authorised laboratories obtaining approved results. Exova Warringtonfire are an authorised laboratory.

• There is a voluntary, independently run round robin scheme for many of the proposed European rolling stock test methods. To provide additional confidence for our customers Exova Warringtonfire take part in this round robin and has obtained approved results.
Inspecting and Certification

Well established and mandatory certification of materials in the marine and construction industry includes aspects such as factory production inspections and sampling of test specimens.

Certification of materials is not required in the rail industry. Notified Bodies (NoBos) in the rail Industry provide general rail vehicle certification, they do not pick up the specific requirements for fire safety of materials (eg. checks on controls for flame retardant addition).

Certification would be beneficial to the rail industry (not just fire behaviour but for confidence in ongoing performance in all important material requirements).
Summary
Summary: Have We Reached Our Final Destination → Harmonised Fire Safety On European Rolling Stock?

• Edition 1 of ‘The Technical Standard’ is likely to be published in February 2013.

• Generally Edition 1 of ‘The Technical Standard’ provides good fire safety, however, a number of significant technical points still need to be addressed. Revision of this document will start immediately upon it’s publication!

• Practically, the next three years will be difficult for all those working to ensure rail vehicles are fire safe

• Edition 2 of ‘The Technical Standard’ will be a robust and well built standard

• Harmonisation should be possible from ~2016

• Further improvements to the assessment system can be made
Summary: The Role Of Accredited Laboratories In Regulation And Market Surveillance

Exova Warringtonfire is more than just a test laboratory, we are a research laboratory.

The role of accredited laboratories, in harmonised fire safety regulations for European rolling stock, includes:

• Development of ‘The Technical Standard’ which provides test methods and pass / fail criteria for the regulation
• Testing against the technical standard under ISO 17025 accreditation
• Support for other aspects to improve the success of regulation in the future:
  • Ongoing review and improvement of technical standard
  • Policing of harmonisation
  • Further industry harmonisation
  • Increased laboratory correlation checks
  • Testing-inspection-certification
Thank You

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