Development of the Future Rail Freight System to Reduce the Occurrences and Impact of Derailment


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Research project

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3 Year Project Commencing October 2011

(Total Budget € 4,800,000)
Background

- European rail freight is of strategic and economic importance
- Derailments cause major network disruption and societal impact
- Large number (low cost) - Small number (high cost)
- ERA initiative to reduce freight train derailments supported by EC
- Emerging research indicates potential for major step forward
Objectives

D-RAIL project aims to provide significant improvements in the detection and prevention of derailments and mitigation of their subsequent effects.

- To provide cost-effective solutions to reduce the occurrences of freight train derailments across Europe by 8 - 12%.
- To reduce derailment-related costs by 10 – 20% through improved mitigation measures.
CONSORTIUM

- Twenty partners from across Europe with a wide geographical representation
- Partners include Infrastructure providers, operators, industry and academia

- Global project which includes International Railways (UIC), Russia (RZD) and USA (Harsco)
- Many of our partners also have significant International rail experience outside the EU

Project is jointly co-ordinated by NewRail (Newcastle University) and UIC
EU- Related Research Projects

D- RAIL Partners active in many important EU related projects
Project breakdown

WP1  Derailment Impact

WP2  Freight Demand & Operation

WP3  Derailment Analysis and Prevention

WP4  Inspection & Monitoring Techniques

WP5  Integration of Monitoring Techniques

WP6  Field Testing & Evaluation

WP7  Operational Assessment & Recommendation

WP8  Dissemination & Exploitation
Derailment impact (WP1)

- Review of existing freight train derailments including causal effects (wide ranging)
- Effectiveness of current technologies and ability to detect and prevent derailment
- Build upon ‘Assessment of Freight Train Derailment Risk Reduction Measures’ (ERA)
- Societal and financial impact of freight derailments for all stakeholders
Information in D-Rail database (six-year period: 01/01/2005 – 31/12/2010):

- Number of derailments
- Causes
- Costs
The ranking of major causes of derailment in Europe

1. Hot axle box and axle journal rupture
2. Excessive track width
3. Wheel failure
4. Skew loading
5. Excessive track twist
6. Track height/cant failure
7. Rail failures
8. Spring & suspension failure
Freight demand & operation (WP2)

- Evaluation of the future freight system towards 2050 (future market needs)

- Impact on forward operation and emerging technologies to support the freight sector

- Evaluate future trends for movement, loading, logistics and sector economics

- Cost/benefit analysis based upon the expected future rail freight market
Derailment analysis and prevention (WP3)

- Identification, simulation and analysis of the key contributory derailment factors
- Improved methods, techniques and understanding of derailments causes
- Provide cost effective solutions to reduce or eliminate the propensity for derailment
- Quantitative assessment of derailment reductions against current benchmark
Inspection & monitoring techniques (WP4)

- Critical and detailed assessment of current inspection and monitoring techniques

- Examine prevention and mitigation for the ‘total freight system’ (vehicle and track)

- Develop from previous findings suitable cost effective technical improvements

- Provide forward functional and operational requirement specification(s)
Integration of monitoring techniques (WP5)

- Development and integration of wayside and onboard monitoring concepts
- Examine how to integrate these various monitoring systems and techniques
- Concept development based on RAMS and LCC assessment and analysis
- Development of business case(s) to support wider industrial implementation
Field testing & evaluation (WP6)

- Field testing and evaluation of developed mitigation and monitoring concepts
- Instrumentation of vehicle/track and system interfaces and subsequent interactions
- Evaluation of the integrated systems (step change) including cross border operation
- Validation and verification of the initial modelling and analysis system
Operational assessment (WP7)

- Summary and impact of the technical and economic assessment of the research

- Assess “best and worst“ case scenarios for a range of boundary operating conditions

- Determine the reduction in derailments in relation to number of monitoring system

- Assess reduction in derailment costs versus associated monitoring whole life costs
Dissemination and exploitation (WP8)

- Dedicated website: [www.d-rail-project.eu](http://www.d-rail-project.eu)

- Information and material dissemination to stakeholders

- Training platform as workshops open for IM’s, railway operators, industry and universities.

- The strategy for the implementation of project results
Expected research outputs

- Quantified reduction of the number of freight derailments and their economic impact
- Recommendations for monitoring systems based on technical/economic grounds
- Reliable implementation scenarios and guidelines for national/international use
- Future technological developments and innovation for industrial applications
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