Organisation intergouvernementale pour les transports internationaux ferroviaires
Zwischenstaatliche Organisation für den internationalen Eisenbahnverkehr
Intergovernmental Organisation for International Carriage by Rail

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RID: **5th Session of the RID Committee of Experts' working group on derailment detection**
(Berne, 19 and 20 April 2016)

Subject: **Contribution to the conclusions of the RID working group on Derailment Detection**

Transmitted by the European Railway Agency (ERA)

1. In accordance with the proposal made by the European Railway Agency (ERA) concerning the preparation of a final report on the topic of derailment detection (see § 27 of OTIF/RID/CE/GTDD/2015-C), ERA has prepared this contribution for the consideration of the working group.

2. It takes the form of a final draft report of the RID working group on derailment detection, proposed at annex, with a view to informing the RID Committee of Experts in May 2016, and the Committee of Technical Experts in June 2016, of the conclusions of this group.

3. ERA believes that the proposed draft is in line with the preliminary conclusions reached at the 4th meeting of the working group and that it may help finalise a consensus report on the subject matter with a view to making the corresponding work programme achievable.

Annex

Draft final report of the RID working group on derailment detection

Background

1. Since RID Committee of Experts on the carriage of dangerous goods by rail proposed to include a provision concerning the detection of derailments, many discussions and contextual developments have brought new perspectives to this topic.

2. In particular, a lot of new information (referenced in footnotes) had to be considered in order to define a potential solution for the sustainable and efficient implementation of this new safety function – derailment detection – within the railway freight transport system.

3. Taking into account these developments, a few major decisions were taken, in particular:

   – in the 2013 edition of RID, it was clarified in section 7.1.1 that the voluntary use of derailment detectors was allowed on condition that the applicable legal framework on authorisation for placing into service of these vehicles was complied with, and

   – in May 2014 the EU Council[1] indicated that "*… the European Railway Agency, in cooperation with the relevant bodies,* (should) *continue to work on the identification of a sustainable solution to detect derailments and mitigate their effects, including the future implementation of this solution*".

4. As a milestone, this report suggests a possible sustainable way forward, taking into account the information collected since 2009 and the progress made in the recent discussions held within the RID working group on derailment detection.

Main conclusions from the discussions held within the RID working group on derailment detection

5. Following a proposal by the European Commission[2] the RID working group on derailment detection organised its discussion around the following items:

   – the progress made in the field of derailment detection in terms of operation and safety since September 2009 (date of the last agreement between EU RISC and TDG committees on derailment detection), including the impact on automatic braking of the train, the probability of false alarms, use in winter conditions,

   – the cost and benefits of the installation, use and maintenance of mandatory derailment detectors,

   – the impact of imposing mandatory derailment detection within the authorisation process for railway rolling stock within EU/OTIF countries,

   – alternative measures to the mandatory use of derailment detectors and their effectiveness (including preventive measures) and evaluation of their advantages/disadvantages in terms of cost and safety in comparison with the derailment detectors.

[1] EU Council, Decision 2014/327/EU of 6 May 2014.

[2] European Commission – Next steps of the working group, OTIF/RID/CE/GTDD/2015/1, 2015.

6. The most relevant conclusions of the discussions that might have a major influence on the preparation of a sustainable solution are summarised below. These findings should serve as a basis for the preparation of a decision on the way forward.

With regard to the safe operation and interoperability of vehicles equipped with detectors (braking effort within the train composition, authorisation for placing into service of equipped vehicles)

7. After the analysis of the most recent scientific results available on the longitudinal train dynamics under braking situations[3], and as already spotted in the Det Norske Veritas Report[4], the working group noted that **if mechanical detectors trigger the automatic braking of a train, this may lead to excessive compressive forces in cases of false alarms**, **depending on the configuration of the train composition**.

8. It was also noted that false alarms of mechanical detectors remained an issue (around 1 to 2 false alarms per year for the fleet equipped in Switzerland – around 1000 wagons) and that, in response to this situation, it was **necessary to set harmonised requirements to ensure the safe and interoperable operation of freight trains** equipped with this technology**, in particular in the case of international transport**. The working group agreed that **such harmonised requirements should be developed by the European Railway Agency in the form of Technical Specifications for Interoperability** and should be transposed into the relevant COTIF Appendices (APTU/ATMF) in the form of Uniform Technical Prescriptions.

9. Meanwhile, the working group proposed that **the voluntary use of the currently available technology should continue to be allowed** as already mentioned in RID 7.1.1. It was confirmed that **the railway undertakings were responsible for controlling any associated operating risks** and that the process for authorising vehicles to be placed into service[5,6], including the use of the Common Safety Method on Evaluation and Risk[7,8], is applicable within the European Union and that equivalent Uniform Technical Prescriptions[9,10] are also applicable within the COTIF region.

10. In addition it was clarified that the **implementation of UIC leaflet 541-08** *"Brakes – Regulations concerning the manufacture of the different brake parts – Derailment detectors for wagons"* **should not be considered as sufficient to comply with the requirements of the ap-**

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[3] Dr Daniel Bing, Derailment detection in rail freight transport – Analysis of influences on longitudinal train dynamics, ISBN: 978-3-87154-520-7, October 2014.

[4] Det Norske Veritas Ltd, Assessment of freight train derailment risk reduction measures – Report B3 – Top ten ranking of safety measures, BA000777/08, 2011.

[5] Directive 2008/57/EC of the European Parliament and of the Council of 17 June 2008 on the interoperability of the rail system within the Community.

[6] European Commission Recommendation of 5 December 2014 on matters related to the placing in service and use of structural subsystems and vehicles under Directives 2008/57/EC and 2004/49/EC of the European Parliament and of the Council.

[7] European Commission Implementing Regulation (EU) 2013/402 of 30 April 2013 on the common safety method for risk evaluation and assessment.

[8] European Commission Implementing Regulation (EU) 2015/1136 of 13 July 2015 amending Implementing Regulation (EU) No 402/2013 on the common safety method for risk evaluation and assessment (Text with EEA relevance).

[9] COTIF Appendix F – APTU, UTP GEN-G – Common Safety Method (CSM) on Risk Evaluation and Assessment (RA), 12 June 2013.

[10] COTIF Appendix G – ATMF, Uniform Rules concerning the Technical Admission of Railway Material used in International Traffic.

plicable legal framework concerning risk assessments and authorisation for placing into service.

With regard to the cost-effective and sustainable development of derailment detection (alternative measures, technical and scientific progress, implementation of innovations)

11. The review of the costs relating to the use of mechanical detectors available on the market today confirmed the assumptions set out in the relevant reports[11,12,13], although potential additional costs linked to the safe integration of this new device into the railway system were identified. **These extra potential costs may strengthen the conclusions of these reports, which already assessed that this technology does not have a good cost-benefit ranking** compared to other more efficient measures to reduce the risks of freight train derailments.

12. In support of this view, both Dr Bing's dissertation and the EU's D-Rail research project[14,15,16] give clear indications that electronic solutions would be feasible and more efficient. It seems that this finding is sustainable, as the entire digitalisation of railway freight transport has started and should develop quickly, offering a favourable context for the use of new electronic safety devices. As a consequence, **it is likely that electronic derailment detection solutions, which were not practicable in the past, will become cost-effective solutions in the near future**.

13. UNIFE confirmed that **prototypes of electronic detectors have already been developed** and in view of the overall context and objectives of Shift2Rail[17], **indicated that if the Shift2Rail framework could facilitate further developments of electronic prototypes, new products may be available within 6 to 8 years**.

14. It was noted that **electronic detection technology has already been integrated successfully into passenger train services**. Therefore, **no negative impacts are expected in terms of the behaviour of the braking system of freight trains when using electronic detectors that trip**, contrary to mechanical technologies which automatically actuate the braking effort within the train composition.

15. In line with the findings of D-Rail and Dr Bing's conclusions, the working group also considered that **the use of telematics in railway freight transport would offer a new environment for using many types of electronic sensors, which would also enable "prevention alarms",** thus providing more flexible and safer operation of freight trains.

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[11] European Railway Agency, Impact Assessment on the use of Derailment Detection Devices in the EU Railway System, ERA/REP/03-2009/SAF, 2009.

[12] Det Norske Veritas Ltd, Assessment of freight train derailment risk reduction measures – Report B3 - Top ten ranking of safety measures, BA000777/08, 2011.

[13] European Railway Agency, Prevention and mitigation of freight train derailments at short and medium terms, ERA/REP/02-2012/SAF, 2012.

[14] D-Rail, Research project of the EU 7th framework programme - Grant Agreement n°285162 WP 5.2 – Outline system requirements specification for pan European freight monitoring, 2014.

[15] D-Rail, Research project of the EU 7th framework programme - Grant Agreement n°285162, WP 7.2 – RAMS analysis and recommendation (technical focus), 2014.

[16] D-Rail, Research project of the EU 7th framework programme - Grant Agreement n°285162, WP 7.3 - LCC analysis and recommendation (economic focus), 2014.

[17] Shift2Rail Joint Undertaking - Multi-Annual Action Plan - Brussels, November 2015.

16. In view of all these new aspects of the discussion, the working group considered that **in order to maintain a favourable economic context for the development of electronic technologies, mechanical detectors should not be mandatory**.

Proposed way forward

17. In line with the findings of the RID working group on derailment detection and in view of the overall objectives of the European Union's White Paper on Transport of 2011 and of the Joint Undertaking initiative Shift2Rail, the following recommendations are submitted to the RID Committee of Experts on the carriage of dangerous goods by rail:

    – the use of mechanical detection technologies should remain voluntary, so there would be no need to amend RID, and in particular the existing note in 7.1.1,

    – railway undertakings and Railway Safety Authorities should take particular care in using mechanical detectors safely, in line with the legislation in force, and it is advisable to check the operating rules in place, notably in the light of admissible compression forces, when using this type of detector,

    – while the safe use of derailment detectors will remain under the responsibility of railway undertakings, harmonised Technical Specifications should be developed to ensure the interoperable use of these systems and to prevent the associated safety risks,

    – such Technical Specifications should cover both types of detectors: 1) those that actuate the brakes within the train composition, 2) those that report an alarm in the driver's cab, without imposing train composition rules that are too costly or varied in the context of international transport,

    – these Technical Specifications should be developed by the European Railway Agency,

    – the development of electronic technologies based on the genuine reporting of alarms needs to be encouraged, as all aspects of them are clearly promising. As these technologies are considered very positively by all the parties that have taken part in the discussions, prototype electronic detectors should be developed further, including demonstrators,

    – to maximise the cost-effectiveness of electronic detectors, a train condition monitoring function should also be integrated, which should be able to report different levels of alarms before a derailment occurs, thus allowing derailments to be prevented in addition to detecting them,

    – opportunities to develop such demonstrators in the framework of Shift2Rail should be checked by the European Commission services.

18. These strategic orientations should give all interested parties a clear indication of the anticipated further development of derailment detection and alarm reporting functions in freight trains.

19. **If the RID Committee of Experts were to adopt the above recommendations**, the anticipated sequence of actions for the European Commission and the European Railway Agency would be as follows:

    – the European Commission should adopt a delegated act in 2016/2017 asking the European Railway Agency to prepare the relevant Technical Specifications related to both types of derailment detection,

– the European Railway Agency should develop these specifications in 2017/2018 and issue its recommendation to the European Commission in July 2018,

– the European Commission should adopt revised Technical Specifications in the form of an executive act in 2019.