



INTERNATIONAL UNION
OF RAILWAYS

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UBS (Unified Braking Scheme) training blueprint

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2. Introduction

In order to convey knowledge of the UBS (Unified braking scheme) solution beyond the RFC1 Rhine Alpine Corridor, this UBS training module was developed as a blueprint that will guide the implementation strategy and the design of key patterns for the railway stakeholders for the introduction of UBS. The UBS plan includes the updating of the relevant technical documentation and the relevant IT software used in the context of the braking programs. The proof of concept and its results will be discussed in a separate report.

3. List of documents

- UIC IRS 40421 - Rules for the consist and braking of international freight trains
- UIC IRS 40472 - Braking sheet, consist list for locomotive drivers and requirements for the exchange of data necessary to the operation of freight rail services
- UIC 544-1 - Brakes - Braking performance
- TrainDY 1st and 2nd reports
- Acceptable means of compliance (AMOC) on Checks and tests before departure, including brakes and checks during operation

4. Basis of training module

This document is intended to be used by the trainee, supervisor/trainer and as a "blueprint" for training.

Based on task 2.1-Country-specific alignment of the UBS framework across Europe and tasks, 1.1-Pilot 'on-site test' operations of the UBS solution along the Rhine-Alpine Corridor and 1.2-Training sessions for operational staff to start using the UBS solution along the Rhine-Alpine Corridor of Activity 1, The fUIC IRSt blueprint turned into designed which containing the guide and structure of the UBS adoption throughout Europe.

Design of precise UBS documentation that consists of the updated of applicable UIC UIC IRS 40421, UIC IRS 40472 and UIC leaflet 544-1 if needed.

TrainDy and UIC IRS 40421, which provide the methodology, RUs / freight operators can easily agree on new, interoperable train configurations with higher productivity and the same level of safety.

UIC IRS 40421 - Rules for the consist and braking of international freight trains

Specifies the requirements for the composition and braking of cross-border freight trains according to their braking regime and their maximum speed in order to accelerate the operation at borders and

transfer points. The document describes the compositions in comparison to the existing safety level, supported by the LCF software (Longitudinal Compressive Force) (e.g. TrainDy). The aim of this method is to create a Europe-wide harmonized approach for the definition of composition rules and the corresponding approval at national level. This methodology is viewed as a guideline that includes necessary requirements and consists mainly of an approved recommendation for performing this analysis, but does not preclude other methods. The method is based on a statistical approach that can theoretically be integrated into other, more general risk assessments. The method takes a relative approach by comparing a new system with a reference system where the latter is accepted as safe system.

UIC 544-1 Brakes - Braking performance

defines braking performance and describes the method for determining the braking performance of rail vehicles and trains. Braking power can be expressed by braked weight or by decelerations. The leaflet also describes the conversion of the braked weight into the percentage braked weight of a vehicle or train for operational purposes. Reference is also made to the limit characteristics that result from the operational application of the percentage braked weight of a train calculated from the specified braked weight of the vehicles for different formations. carried out in many (but not all) Central European countries. The brochure also gives guidelines for the braking distances that can be achieved in braking position 'G'. The evaluation curves are shown graphically and mathematically. The evaluation in the form of the braked weight applies to trains and individual vehicles up to a speed of 200 km / h. The evaluation after decelerations only applies to trains, however, regardless of the speed. The assessment of the brakes is therefore not based on the worst possible condition of the vehicle, e.g. braking force tolerances, friction coefficient scatter, deteriorated efficiency, etc. In addition, the leaflet provides information on calculating the performance of screw brakes with handwheels and spring-loaded brakes.

TrainDy Software

Safety simulation software. In order to increase the productivity of freight trains and harmonize the standards of different countries, a reliable numerical simulator is required, since in-line test campaigns are expensive and should be kept to a minimum. In addition, this simulator should be able to be used by all railway operators without any problems. To meet these challenges, the UIC decided to improve and validate the TrainDy software. Longitudinal forces (LF), which are exchanged by two successive vehicles in a train, have a significant influence on the correct length, the applicable tractive force, the payload and the permissible speed of freight trains.

Wrong decisions regarding these parameters lead to accidents due to derailments, damage to wagons, goods and railways, but also higher maintenance costs and lower capacities. In order to increase the productivity of freight trains, the International Union of Railways (UIC) provides LF calculation software: TrainDy. The software has already been validated by a group of UIC experts and received the UIC certificate in April 2008. This process has been divided into two main parts: pneumatic validation and dynamic validation; Pneumatic validation resulted in the mapping of the most commonly used

European braking devices; gives a maximum error of 10% if one compares the pressures in the brake cylinders with the experimental data. Data about trains inline. The required test data was provided by three major European railway companies (Deutsche Bahn, SNCF and Trenitalia). In addition, Faiveley Transport provided experimental results from its own train brake simulator. The dynamic validation was carried out by comparing the longitudinal forces and the braking distances both with the software previously used by the UIC and directly with the experimental data. a braking locomotive (distributed braking). The following is an excerpt from the software simulation.

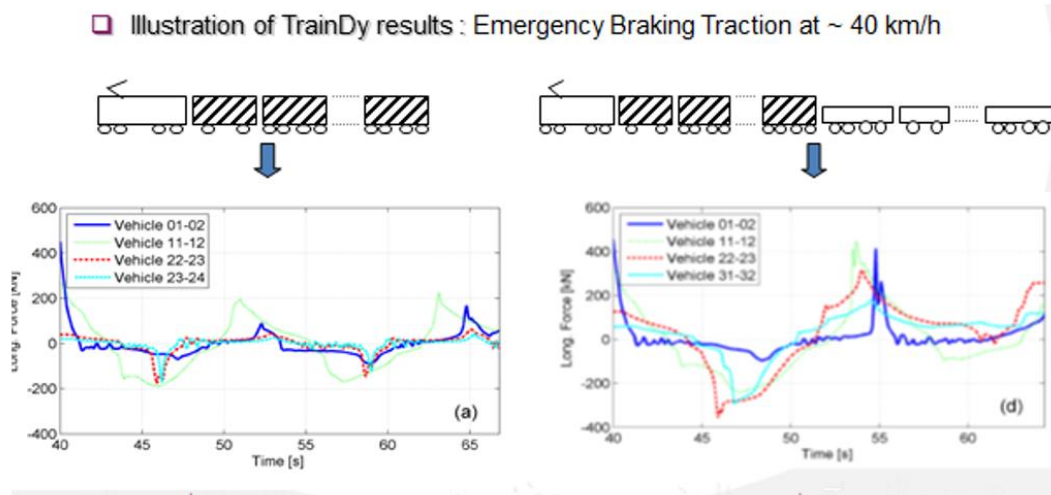


Figure 1: An example for TrainDY Study result

4.1. The training information

Title of training: Implementation of the UBS across Europe

Training description: This training includes the information about the updated braking sheets, developments in braking performance requirements and train compositions. In addition, it is explained in the training the definition of AMOC concept and the content of the latest Checks and test AMOC document.

Required prerequisites and level: Train drivers, braking experts/operational experts from the RU, IM experts.

4.2. The training contents

Title: Overview on solving priority 1 of the Log Book issue and implementing the Unified Braking Scheme (UBS)

Content:

- The aim of project

- The details of priority 1 of the Issue logbook
- An overview about the background of the new rules to solve the issues
- The aim of selection of Rhine Alpine corridor as a starting point
- The actions have been carried out of update the rules in the past regarding UBS action
- To update process of the brake sheet and UIC IRS 40472, 1st TrainDy Study, updating UIC IRS 40421 to decrease the dwell time at the border, unify the common understanding of braking rules, as much as possible to harmonize the rules
- The implementing plan of UBS rules on Rhine Alpine Corridor
- The expected results at the end of the projects

Title: The new brake sheet and its implementation to achieve an unified application

Content:

- The general explanation about the status and expected targets after implementing the new rules.
- The differences between the old brake sheet and new one. Item by item explanation of the new brake sheet.
- The advantages of new brake sheet.
- Information about the updated UIC IRS 40472. The aim of this leaflet and explanation of what points were updated.
- Presenting the best practices and experiences which comes from Activity 1. The challenges that has been faced in the Rhine Alpine Corridor.
- The feedback (Drivers and field staff opinions possible bureaucratic obstacles related to RUs and IMs that gained from test trains which operated in the Rhine Alpine Corridor.
- Statistical data regarding dwell time, effectiveness of usage etc. before and after using brake sheet.

Title: Implementation of new braking rules to establish a harmonization in TEN – T Networks

Content:

- Detailed information about 1st TrainDy study.
- Implementation of 1st TrainDy Study results in UIC IRS 40421.
- Information about the updated UIC IRS 40421.
- The differences between the old leaflet and new one. The improvements in the new leaflet.
- Application of the cases according to new barking rules and train compositions.
- Giving examples to RUs, IMs, NSAs etc. about application of the new rules.
- Advantages of the new rules and possible challenges in the way of implementation.
- Comparing the national rules and the new rules for every Countries.

- Presenting the best practices and experiences which comes from Activity 1.
- The challenges that has been faced in the Rhine Alpine Corridor.
- The feedback (Drivers and field staff opinions possible bureaucratic obstacles related to RUs and IMs, that gained from test trains which operated in the Rhine Alpine Corridor.
- Statistical data regarding dwell time, effectiveness of usage etc. before and after using brake sheet.

Title: As a part of an output of the project - Test & Check AMoC

Content:

- The information about the AMoCs. The necessity of AMoC. The aim of AMoC.
- General explanation of Test & Check AMoC.
- The relation between UIC IRS 40421 and UIC IRS 40472 leaflets and Test & Check AMoC.

4.3. Training objectives and outcomes

Objectives:

Training is to:

- highlight differences between the current and target situation,
- explain the barriers and actions to be taken by each of the concerned stakeholders,
- determine a method to overcome individual barriers whilst not degrading the level of safety in the implementation period,
- identify the best practices that comes from RFC 1 Activity,
- show the results after implementing the new rules,
- identify the changes in the updated UIC IRS 40421 and UIC IRS 40472,
- explain the validation process of the new rules by using TrainDY tool and the ability of TrainDY tool,
- show the current status and obstacles in front of the braking harmonization process in Europe
- give information the latest situation of AMOC Checks and test

Outcomes:

After the training the expectation is to achieve the following outputs:

- Trainee will have competence on the application of the new brake rules
- Cross border delays will be reduced
- The implementation of the new rules will be extended in the other corridors
- Unified brake rules in the Europe will be achieved

- The updated UIC IRSs and the new AMOC will be a guide to achieve a aligned operation

4.4. Training format

The training will be held either face to face if impossible then online. It will be laid out the topic-specific learning materials and the format for delivery.

4.5. Training resources

There will be extensive resources available to aid the trainee in understanding knowledge and practicing and applying concepts.

These could include but are not limited to:

- Course texts
- Online resources
- Multimedia assets
- UIC IRSs (UIC IRS 40421, UIC IRS 40472, AMOC Checks and Test etc.) standards, reports (TrainDY) and Regulations

Material that is presented in multimedia formats for bolster trainee engagement. Because individuals learn best in different ways (e.g., visually vs. auditory), the available resources should provide your trainee with multiple pathways to comprehend the subject matter. Performing an inventory of your learning resources will help you map each one to specific course objectives as well as to categorize which resources are required materials and which are supplemental.

4.6. Activities and assessment

The level of competence skills acquired of the participants will be assessed by making a quiz.

4.7. Documentation

- UIC IRS 40421
- UIC IRS 40472
- UIC 544-1
- TrainDY 1st and 2nd reports
- AMOC Checks and test
- International brake sheet and wagon list
- UBS training documents (DB Cargo AG)
- Instruction to employees (DB Cargo AG)
- Information on application (DB Cargo AG)
- Train path documents (DB Cargo AG)

5. Expected results

This training will contribute to the implementation of new braking rules to establish a harmonization in TEN – T Networks. Transferring the experiences and best practices that were gained from Rhine Alpine Corridor to the other RFC Regions will be the important output. The new brake sheet and its implementation to achieve a unified application. The explanation of the changes, improvements and additional points are going to be in the updated UIC IRS 40472 and UIC IRS 40421 in details. At the end of the training, the points will be clarified in terms of open or possible misunderstandings regarding the rules.

As a part of an output of the project - Test & Check AMoC will increase the awareness about the AMoCs and to clarify the link between UIC IRSs, standards, code of practices and AMoC.

6. List of appendices

Appendix A - 1st TrainDy Study report

Appendix B - 2nd TrainDy Study report

Appendix C – AMOC Checks & Test

Appendix D – Training documents

Appendix E – UIC IRS 40421

Appendix F – UIC IRS 40472

Appendix G – UIC IRS 544-1

Appendix H – International brake sheet and wagon list

Appendix A - 1st TrainDy Study report



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Appendix B - 2nd TrainDy Study report



UIC-CEF-UBS (XRail)
20220131.pdf



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Appendix C – AMOC Checks & Test

https://www.era.europa.eu/library/opinions-and-technical-advice_en

Appendix D – Training documents



UBS training
documents.pdf



Instruction to
employees.pdf



Annex 2 Information
on application.pdf



Train path
documents.pdf



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Appendix E – UIC IRS 40421

<https://www.shop-etc.com/fr/rules-for-the-consist-and-braking-of-international-freight-trains-9742>



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Appendix F – UIC IRS 40472

To be added



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Appendix G – UIC IRS 544-1

<https://www.shop-etc.com/fr/brakes-braking-performance>

Appendix H – International brake sheet and wagon list



International brake
sheet and wagon list,