TRENITALIA
GRUPPO FERROVIE DELLO STATO

Derailment Detectors for wagons

OTIF Meeting – Rome, 13th ÷ 15th October 2014

Marco Caposciutti

Context

According to the European Safety Directive, Trenitalia, as a Railway Undertaking, is responsible for the safe operation of the railway system. Regarding some topics about safety, Trenitalia has undertaken technical and operational actions in order to achieve during the operation of its trains a safety level higher than that coming from the simple respect of operational regulations and technical standards.

Furthermore Trenitalia participates with an active role at various research projects about the matter.

In this context the presentation describes the activity for:

-*Service tests of freight wagons equipped with derailment detectors (types approved by UIC: Appendix A of the Leaflet 541-08);*

-*Participation to a research project for a new kind of derailment detector.*

Derailment Detectors for wagons

2 types of derailment detectors has been homologated by UIC:

- *Type EDT 101, by Knorr-Bremse;*
- *Type MDV 100, by Wabtec/Poli.*

Up to now the equipment of wagons with derailment detectors is not mandatory. Trenitalia decided to make service tests using traffic trains and purchased 100 detectors of the two UIC homologated types (50 for each of them). The contracts concern not only the provision of the devices but also the design of the interfaces with the wagons and the installation. **The first installations will be made within October '14.**

The following types of wagons were chosen for the service tests:

- **Shimmns** and **Rgmms** types (bogies wagons);
- **Hbillns** and **Kgps** (2 axles wagons);

Previous applications (i.e. the tests made by SBB) didn't involve 2 axles wagons.

Description of the Derailment Detector for wagons

- On each wagon 2 detectors are installed, one for each front; they are generally installed between the end cock and the left buffer and they are pneumatically connected to the brake pipe (***picture 1***).
- The wagons equipped with the detectors are easily recognisable by means of the pictograms applied on both sides of the wagon (***picture 2***).
- Each detector has a pictogram that shows the date of the programmed maintenance (***picture 3***).

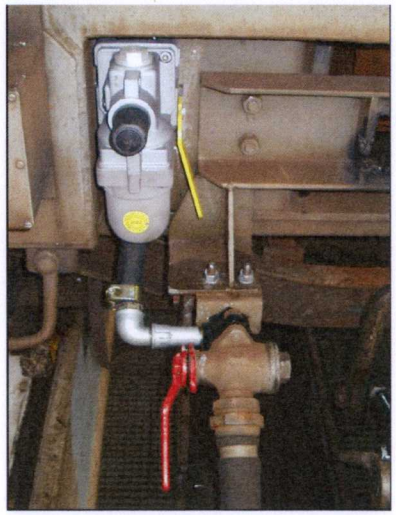

Figura 1

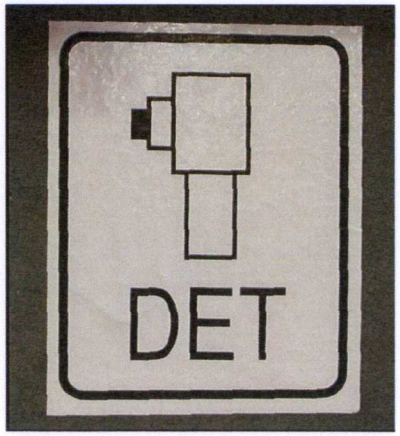

Figura 2

Figura 3

Description of the Derailment Detector for wagons

- Each detector is equipped with a cut off cock in order to isolate the device from the brake pipe in case of failure.

Figura 4
DDD collegato alla CG

Figura 5
DDD isolato dalla CG

- The derailment detector monitors vertical accelerations at wagon-body level and when its limit threshold is reached it opens a valve to exhaust the main brake pipe to atmosphere.

Description of the Derailment Detector for wagons

- The derailment detector has a red visual indicator that takes off when the device has worked; so the driver can identify the wagon whose detector intervented (particularly in case of false intervention).

Figura 6
DDD armato

Figura 7
DDD scattato

Description of the Derailment Detector for wagons

- The functioning of homologated UIC derailment detectors is based on the weight/spring system, that is sensible at a fixed level of acceleration, but not able to discriminate the duration of the event;
- The device is triggered after the derailment occurred;
- There is a residual risk of undue functioning, with the consequence of the stop of the train and the possibility of train separation.

The aim of the in-service tests

The aim of the in-service tests is checking the behaviour of the derailment detectors for wagons during the operation in order to evaluate their reliability (faults and false alarms)

In order to obtain this, the rules for the exploitation and the maintenance will be drafted

The new kinds of derailment detectors

The new kind of derailment detectors, still in a research phase and not homologated by UIC, is based on different principles: they have electronic sensors (accelerometers and/or gyroscopes installed on boogies) and electronic on board equipment for the control functions.

This new device is designed for managing advanced control algorithms with the aims of:

- *Decreasing false alarms of the pure mechanic system;*
- *Preventing the effective derailment in case of faults on the wheelset (failure of leaf springs, large flats on the wheels...) ;*
- *Sending an alarm signal to the driver cab in order to avoid the activation of an emergency braking from intermediate wagon, decreasing the risk of train separation.*

The new kinds of derailment detectors

Research projects are underway about this matter, but this new kind of device is not homologated by UIC yet.

Trenitalia is involved in 3 research projects:

a) Research project with *Politecnico of Torino* and *Faiveley* for in-service tests of an equipment with an axle generator in order to produce electric energy; these tests are planned on a wagon and on a coach type MD.
b) Research project with *Politecnico of Milano* for the development of a complete system with energy generation, based on vibrations and transmission towards the locomotive.
c) Participation to the European research project called ***Shift2Rail,*** where in the IP5 task the definition of a new generation equipment detector is foreseen.