Rail Accident and Incident Investigation Unit

Summary

Safety Investigation Report

Derailment of a Lineas freight train

Schaerbeek - 7 February 2018

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February 2022

REPORT VERSION TABLE

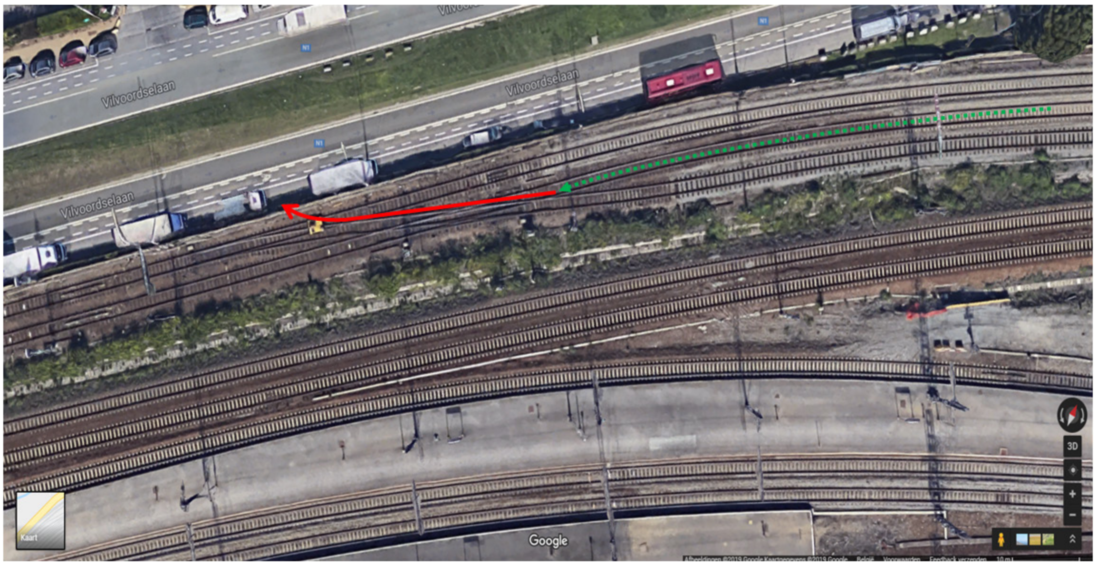
Version number	Subject of revision	Date
1.0	First version	25/02/2022

Any use of this report with a different aim than of accident prevention - for example in order to attribute liability - individual or collective blame in particular - would be a complete distortion of the aims of this report, the methods used to assemble it, the selection of facts collected, the nature of questions posed and the ideas organising it, to which the notion of liability is unknown. The conclusions which could be deduced from this would therefore be abusive in the literal sense of the term.
In case of contradiction between certain words and terms, it is necessary to refer to the Dutch version.

SUMMARY

On 7 February 2018 at 01:08 a.m., train E48810 (Schaerbeek-Formation - Tergnier, 28 freight wagons - 562 m - 749 tons, locomotive HLE 1312, train driver Lineas) departs in Schaerbeek-Formation towards track A of L.28.

In advance of the first signal met on L.28, signal F-L.8, the track forms a curve with a switch at the end of the curve.



Locomotive HLE1312 derails at the end of the curve, damages the switch, crosses the adjacent track, and comes to a stop on the public road, where the locomotive collides with parked road vehicles. The first 3 wagons partially derail. During the derailment, the train driver is seriously injured.

The technical investigation includes the analysis of the locomotive's speed recordings and the inspection of the derailed locomotive, on the one hand, and the analysis of the operation of the signals and the inspection of the tracks at the scene of the accident, on the other hand.

The recordings of the passage of previous trains and of the operation of signals and of switches show that the signals and switches functioned normally.

During the derailment, the nose and bogies of the locomotive are damaged. Several points and crossings under the locomotive are ripped off or damaged. The locomotive is inspected on the premises and the condition of the driver's cab is determined.

In consultation with all parties, it is decided to take the locomotive to the workshops in Schaerbeek for further technical investigation to check the geometry of the wheels.

From the measurements of the wheels, it can be concluded with reasonable certainty that the locomotive complied with the technical requirements for rolling stock at the time of the accident, and that the damage observed is the result of the derailment.

The examination of the tracks at the scene of the derailment reveals that the derailment began at the expansion joint on distance point 605, and that several sleepers and fastenings in the area just before and after this expansion joint show defects (see Chapter 3.4).

The indications of derailment, shifted base plates, and inefficient sleeper screw connections are clearly visible on the left rail of the track. That is why it is decided by mutual agreement to subject the sleeper screws to a tensile test just before and after the expansion joint, in accordance with Infrabel's instructions for use.

In cooperation with Infrabel, tensile tests are performed on the sleeper screws of the left rail. The sleeper screws are pulled out of the sleepers at low tractive forces, which shows that the fastenings are inefficient.

Direct cause

According to the retained hypothesis,It is assumed that the direct cause of the derailment is the opening up of the track as a result of the inefficient fastening of the rails to the sleepers at an expansion joint and in a curve.

No recommendation: Line 28 in Schaerbeek has been renovated since the derailment.

The investigation therefore focused on whether these defects were identified earlier and, if so, whether the appropriate control tasks were carried out, and whether the necessary maintenance tasks were carried out correctly.

Pre-accident findings

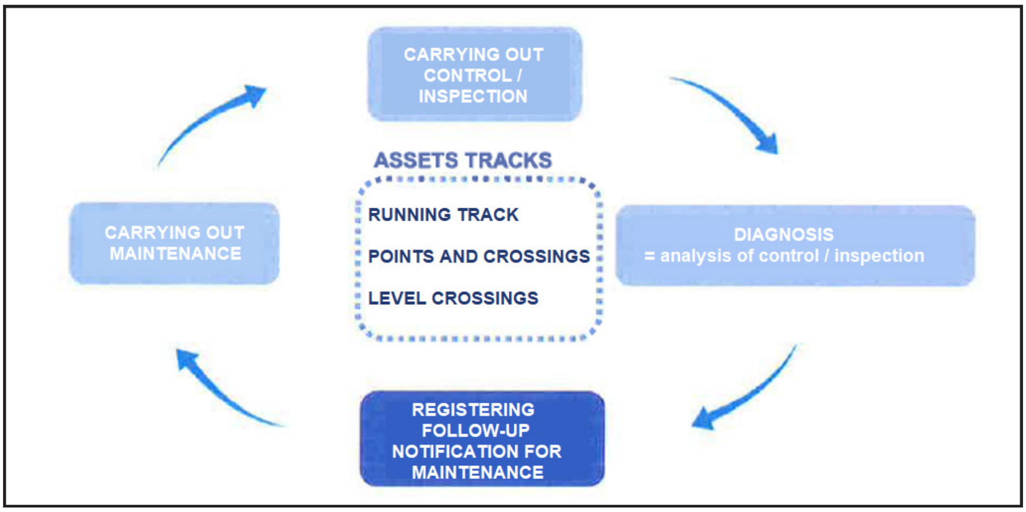
During the two years preceding the accident, a number of findings were made which provide important indications for the problem at the expansion joint:

- The poor condition of the sleepers (see photos and comments in Chapter 3.4): a clear indication of a possible inefficient fastening of the rails to the sleepers;
- The condition of the ring springs: several ring springs are not compressed: a clear indication of a possible inefficient fastening of the rails to the sleepers;
- The findings at the joint;
- Shifted base plates;
- Partially lifted sleeper screws;
- …

These findings, reinforced with information from the EM130 measurement campaigns, must prompt a local team responsible for 'control and maintenance' to carry out a very thorough 'control' (not merely a 'visual' one) on the premises.

Human and organisational factor analysis: risk mitigation measures

The Infrastructure Manager has put in place a process of maintenance works to ensure the regularity and safety of operations. This process, hereafter referred to as the 'control and maintenance' process, includes the detection of problems followed by maintenance, repair or renovation works to meet them.
The 'control and maintenance' process follows a PDCA cycle (Plan Do Check Act) as provided by the Infrastructure Manager.



Indirect factor

According to the retained hypothesis, the indirect cause of the opening up of the track is the failure to perform the 'control and maintenance' process according to the procedures provided by the Infrastructure Manager.

No recommendation: a discussion of the events and a reminder of the procedures took place.

INFORMATION AND COMMUNICATION

The Infrastructure Manager has provided communication channels to ensure that safety-sensitive information on 'control and maintenance' is exchanged. The Infrastructure Manager provides a number of support services for Railway Engineers:

- computer applications help the Railway Engineer to plan and follow up 'control and maintenance' (preventive maintenance);
- measurement results of the EM130 measurement campaigns provide a Railway Engineer with useful and reliable information about existing deviations in track geometry;
- the measurement trains department checks whether the measurement results are complete and correct, does a filtering of the measurement errors, and enters in a computer application RIAM T4 notifications indicating to the successive local Railway Engineers that they have to have (curative) 'control and maintenance' carried out within a specified deadline.

Information about the results of the successive EM130 measurement campaigns in the area of the accident in Schaerbeek is communicated in time, and points to an existing local problem at an expansion joint: deviating geometric values are registered up to 5 times, and the evolution of the measurement results points to an ever-increasing deterioration of the quality of the track near the expansion joint.

The investigation shows that in the area of the accident in Schaerbeek, safety-sensitive information from the measuring campaigns is exchanged in an ambiguous way:

- the results of the 2015-2017 measurement campaigns in the area of the accident lead to different formulations of the diagnoses: T4 assignments are sometimes formulated in a specific way (distance point), sometimes in a general way (an area);
- the deviations in the track geometry found during the EM130 measurement campaign in autumn 2017 are distorted by incorrect parameterisation;
- the deviations in the track geometry found during the EM130 measurement campaign in autumn 2017 are not converted into a new T4 notification;
- no link is made between the measurement results of successive measurement campaigns;
- in autumn 2017, no reminder is sent for the expired 'urgent' T4 notification introduced in spring 2017.

In addition, the T4 assignments entered in the field are converted into 'control and maintenance' assignments in different ways.

Systemic factor 1 – Information and communication

The diagnoses resulting from 'checks' are ambiguously converted into 'control and maintenance' notifications or work instructions, and when diagnosing, no link is made between successive measurement results.

No recommendation

In application of the PDCA principle and in relation to 'Information and communication', Infrabel has undertaken four actions to improve performance in relation to the result area concerned (Cf. Chapter 5 Measures taken).

OPERATIONAL PLANNING AND CONTROL

Successive Rail Engineers schedule or reschedule the maintenance tasks resulting from T4 assignments and have to follow up this schedule. As it turns out, no trace of completion of this assignment can be found in any work sheets.
At the end of 2016, the need to 'replace and tamp sleepers' is diagnosed on the site. The work is scheduled to be carried out in early March during a so-called 'massification'. Due to circumstances, the assignment cannot be carried out. The assignment is rescheduled, but the wording changes. As it turns out, no trace of completion of this assignment can be found in any work sheets.
A similar problem occurs in 2017 when the T4 notification for the expansion joint area is closed and replaced by a 'control and maintenance' following an automatically generated T3 assignment.

At the end of 2017, an expired 'urgent' T4 notification, introduced after the spring 2017 measurement campaign, is still outstanding. No trace of completion of this assignment can be found in any work sheets.

Systemic factor 2 – Operational planning and control

The follow-up and traceability of the follow-up of a number of 'control and maintenance' assignments is not optimal.

No recommendation

In application of the PDCA principle and in relation to 'Operational planning and control', Infrabel has undertaken two actions to improve performance in relation to the result area concerned (Cf. Chapter 5 Measures taken).

PERFORMANCE ASSESSMENT - MONITORING

Planned 'control and maintenance' activities were partially or fully postponed twice. The follow-up of the postponed activities is inefficient, and a T4 assignment is not followed up within the mandatory deadlines.
A list of 'outstanding and expired T4 assignments' shows that an old 'extremely urgent' T4 assignment is outstanding and expired months ago. Supervision using the list of outstanding T4 assignments could have ensured that the Railway Engineer was given more prompt notice to proceed with this overdue intervention without delay.
Support services should also have drawn attention to the local problem after the EM130 measurement campaign in autumn 2017 and could have made a link with earlier findings and with the outstanding T4 assignment.

Systemic factor 3 – Performance assessment - monitoring

The PDCA principle, which has been put in place by the Infrastructure Manager to evaluate the 'control and maintenance' process by supervision / audit / control, and/or inspection, has not been efficient enough to identify the failure of the 'control and maintenance' process in time.

No recommendation

In application of the PDCA principle and in relation to 'Performance assessment - monitoring', Infrabel has undertaken two actions to improve performance in relation to the result area concerned (Cf. Chapter 5 Measures taken).

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