

Summary

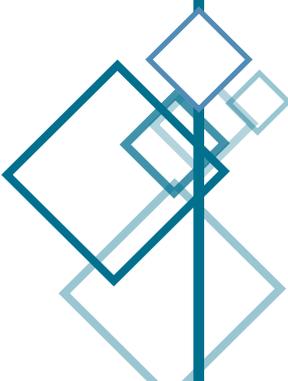
Safety Investigation Report

Derailment of an SNCB/NMBS passenger train

Weerde - 28 January 2021

REPORT VERSION TABLE

<u>Version number</u>	<u>Subject of revision</u>	<u>Date</u>
1.0	First version	16/03/2022
2.0	New structure	04/05/2022

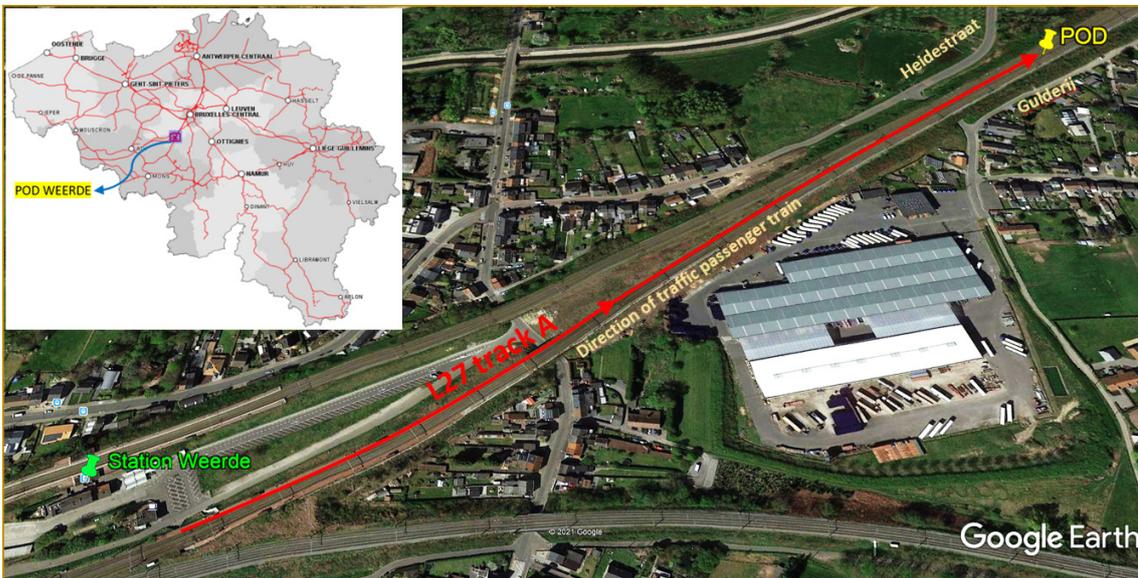


*Any use of this report with a different aim than of accident prevention - for example in order to attribute liability - individual or collective blame in particular - would be a complete distortion of the aims of this report, the methods used to assemble it, the selection of facts collected, the nature 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

EVENT

As a partial assignment within the framework agreement “renewal of main line rails Area North East” between the infrastructure manager Infrabel and the contractor Strukton Rail, the contractor carries out rail renewal works during six nights in the period from 19 to 27 January 2021. The works take place between Weerde and Mechelen on L27 track A. During the night of 27 to 28 January, clearance works are then carried out: the old rails are cut in the six-foot way so that they can be loaded and removed later. The rail cutting works are completed on time on 28 January, and the track is put back into service at around 05:00 a.m.



The SNCB/NMBS passenger train E1954 (Charleroi-Sud – Antwerpen-Centraal) departs from Weerde station towards Mechelen on 28 January at 06:12 a.m. E1954 is the first movement on L27 track A.

832 metres in advance of Weerde station, the passenger train derailed with the second wheelset axle of the first bogie. As a result of the shock, the train driver performs an emergency brake at 06:13 a.m. The speed of the train at that time is 85 km/h.

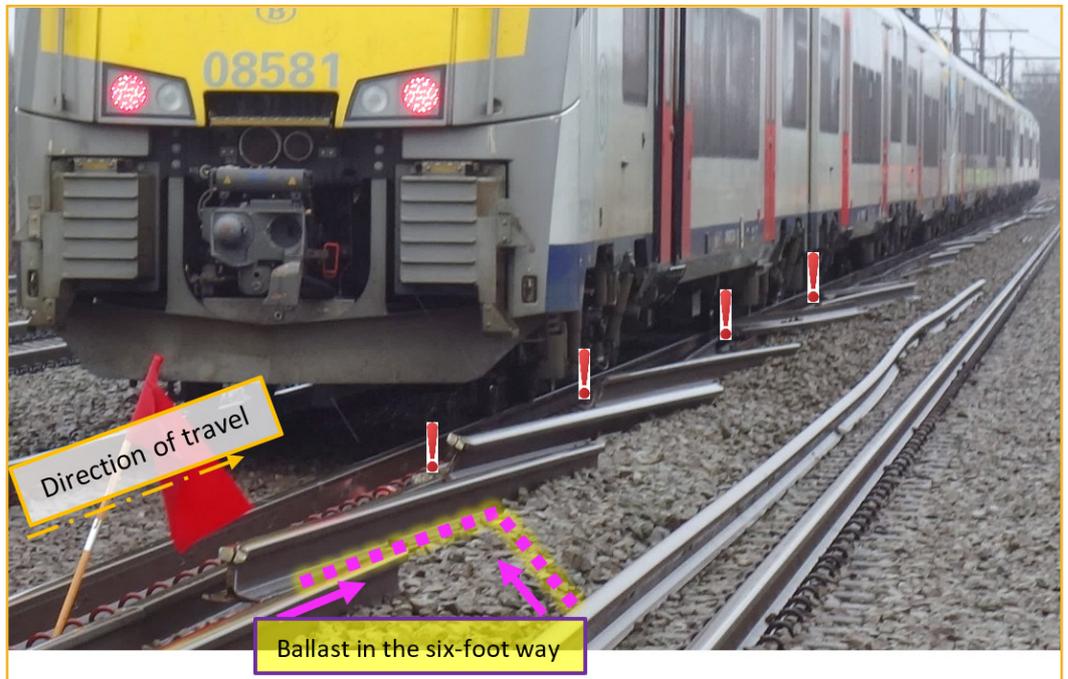
The train driver and the 15 passengers on board are unharmed. Between the location of the derailment and the place where the train comes to a standstill, damaged Pandrol clips, shifted concrete sleepers, and destroyed railway cabling can be observed. There are various impact and abrasion damages to the chassis of the first bogie of the passenger train.

INVESTIGATION

The investigation of the tracks at the place of the incident reveals the location of the derailment at kilometre marker 17.206: on the outer side of the left rail of the track (the direction of travel being in normal track regime) on the basis of the first detached Pandrol clip; on the inner side of the right rail of the track on the basis of the impact on a concrete sleeper as well as a first detached Pandrol clip.



Then, at the location of the accident, a gauge measurement reveals that four cut rails, which lie diagonally on the top of the ballast in the six-foot way, encroach on the clearance gauge.



At the level of the first bogie of the train, the first damage to an axle-bearing can be observed. Later, when inspecting the rolling stock during the technical investigation, a piece of rail can be used to simulate that the course of the fracture line of the axle-bearing corresponds to the profile of the running surface.

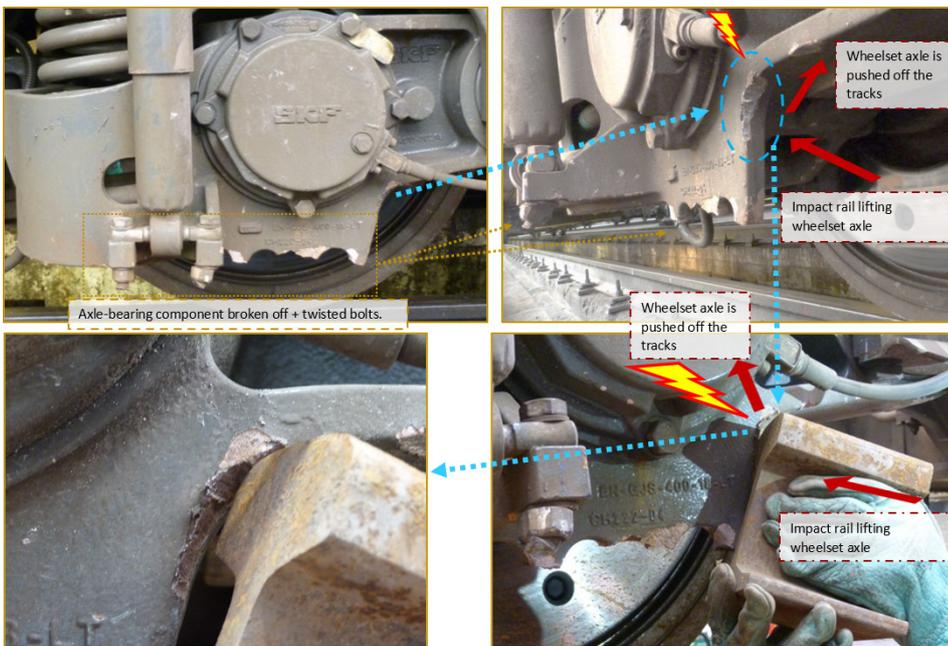


Rolling surface of the rail corresponds to the fracture line of the axle-bearing

A component of the axle-bearing was also broken off at the level of wheel number 21. The bolts at the level of the primary suspension are twisted in the direction that corresponds to when they come into contact with a rail while in motion.

Where the component of the axle-bearing is curved, an impact is observed. A piece of rail can be used to simulate that the damage could originate from a collision with a rail.

Wheelset axle A50910-000541-5 with wheel numbers 21 and 22 is the derailed wheelset axle and, bearing in mind the impact damage, the hypothesis is plausible that a collision with the head of a rail actually occurred at this location and that, as a result of the impact, the wheelset axle was lifted and pushed off the tracks.



Axle-bearing component broken off + twisted bolts.

Wheelset axle is pushed off the tracks

Impact rail lifting wheelset axle

Wheelset axle is pushed off the tracks

Impact rail lifting wheelset axle

In addition to the investigation of the tracks on the spot, technical investigation of the rolling stock in the SNCB/NMBS workshops in Schaerbeek (train set) and Mechelen (bogie), among other things, the RAIU conducts interviews with the relevant staff of the infrastructure manager, contractor, and subcontractor. The safety investigation aims to identify the factors that played a role in the incident, and the safety recommendations that can be done.

CAUSAL FACTORS

A component of an axle-bearing collides with a cut rail lying in the six-foot way, lifting the first wheelset axle and pushing it off the tracks. The wheels of the second wheelset axle end up to the left of the rails of L27 track A on which the train ran, and the derailment is a fact.

The **direct cause** of the derailment is the collision with a rail that, after being cut, encroaches on the clearance gauge.

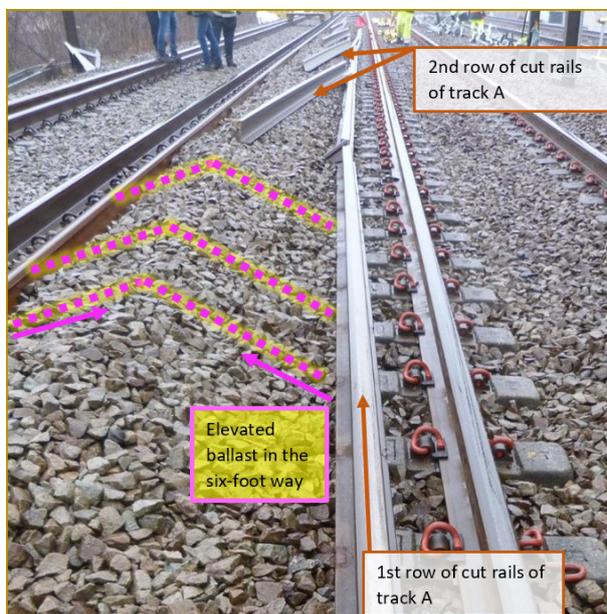


CONTRIBUTING FACTORS

After being cut, the rails lie on the ballast in the six-foot way. Despite the fact that levelling works would have been carried out earlier, the ballast in the middle of the six-foot way is remarkably higher. This elevated ballast has contributed to the risk of cut rails lying on it encroaching on the clearance gauge. In its specifications, the infrastructure manager states: *“Equipment, tools, and materials must not cause a nuisance where they are placed, nor be left in an unstable condition.”*

A **first contributing factor** to the derailment is the encroachment of a cut rail on the clearance gauge.

The RAIU does not make a recommendation.



The clearance gauge is only checked by the subcontractor's crane operator, who visually checks the position of the cut rail during the cutting works. After the execution of the works, it is the contractor who notifies the infrastructure manager that the works are completed, and that all encroachments on the danger zone have been removed. Prior to this notification, the contractor does not organise a check of the position of the cut rails in the six-foot way.

A **second contributing factor** is the absence of a check of the position of cut rails after the execution of the works.

The RAIU does not make a recommendation.

The Agent in Charge of the Execution of the Works (ARET/VBUW¹) monitors the execution of the works and relies on the contractor's declaration that all encroachments on the clearance gauge have been removed. For the final decision to release the track, the regulations insufficiently describe the control tasks the ARET/VBUW must have carried out first.

A **third contributing factor** is the insufficient description of the control tasks the ARET/VBUW of the infrastructure manager carries out after the completion of the works, before putting the track back into service.

Recommendation: the RAIU recommends that the DRSI should ensure that the infrastructure manager develops the regulations regarding the powers/duties of the ARET/VBUW in more specific terms in relation to the powers of the contractor.

¹ ARET = Agent responsable de l'exécution des travaux
VBUW = Verantwoordelijke Bediende voor de Uitvoering van de Werken

SYSTEMIC FACTORS

In the absence of work instructions, employees fall back on routine action: they act in accordance with a working method that has become commonplace. Work instructions, which set out the way in which works must be carried out, provide clarity and structure, which benefits the quality and safety of the works. However, the absence of detailed guidelines increases the risk of errors.

A **first systemic factor** is that the contractor and subcontractor have no identification and description of the processes and activities for storing the cut rails.

Recommendation: the RAIU recommends that the contractor and subcontractor concerned develop a process concerning the activity and monitoring of rail cutting.

The risk of a type II encroachment, where cut rails encroach on the clearance gauge, and thus pose a specific risk of rail collision with rolling stock, has not been included in the risk analysis. As not detected, there are no risk management measures in place to prevent cut rails from causing a nuisance or being left in an unstable condition.

A **second systemic factor** is that the contractor does not identify and analyse all operational, organisational, and technical risks relevant to the rail cutting works.

Recommendation: the RAIU recommends the contractor to identify risks inherent to the rail cutting works, and include them in their risk analysis, including risk management measures.

One step further than the failure to carry out a check, is the failure to provide for a check on the rails before putting the track into service.

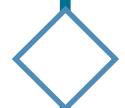
A **third systemic factor** is that the contractor does not monitor that a check has been carried out at the place where cut rails lie in the six-foot way before the track is put into service.

Recommendation: the RAIU recommends the contractor concerned to monitor that the clearance gauge has been checked after the execution of the works.

The specifications of the infrastructure manager stipulate that materials must not cause any nuisance and must be stable, but he does not notice that the relevant safety risk of a type II encroachment, where cut rails encroach on the clearance gauge, and thus pose a specific risk of rail collision with rolling stock, has not been included in the risk analysis of the contractor.

A **fourth systemic factor** is that the infrastructure manager insufficiently monitors contractors' awareness with regard to potential safety risks relating to the position of cut rails.

Recommendation: the RAIU recommends the DRSI to verify that the infrastructure manager raises the awareness of contractors on potential safety risks relating to the position of cut rails, and, by extension, on other potential safety risks.



Rail Accident and Incident Investigation Unit
<http://www.raiiu.be>

