

Summary

Safety Investigation Report

Derailment of a wagon of a freight train

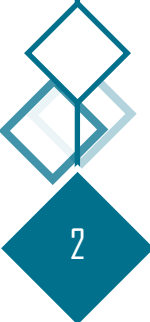
Bressoux - 29/08/2022

REPORT VERSION TABLE

Version number	Subject of revision	Date
1.0	First version	27/07/2023

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 French version.







SUMMARY

Cellulose bales produced in Brazil for a customer in Romania are transported by ship to the port of Vlissingen in the Netherlands.

The company Verbrugge Zeeland Terminals, which has an establishment in these port facilities, loads some of these bales into various containers.

One of the containers is then placed by the company Verbrugge Zeeland Terminals on a lorry for transport to the Zeebrugge terminal: the container doors are closed and sealed by the lorry driver.

At the Zeebrugge terminal, the container is loaded, along with a second container, onto a 3-bogie container wagon.

The wagon is owned by the company Hupac, which is also the entity in charge of maintenance.

The wagon is fitted with a plate interdependent with the wagon chassis preventing the container doors from opening.

The wagon comes in the seventh position of the freight train Z40653 of railway undertaking Railtraxx.

On 28 August, the freight train Z40653 departs from the Zeebrugge fan of sidings and arrives at the Muizen-Goederen fan of sidings. At around 11:15 p.m., the freight train restarts from the Muizen-Goederen fan of sidings.

Shortly before 1:00 a.m., the train runs on track A of line 40. About 20 metres after entering the Froidmont tunnel near Bressoux, the right-hand wheels of the first bogie of the seventh wagon of the train lift and then fall back off the rails.

The train continues its journey towards Bressoux, causing damage to the track.

Approximately 2 kilometres after the Froidmont tunnel, at the entrance to the Bressoux station, the train runs over a switch: the first part of the train up to the sixth wagon continues its journey on track A of line 40, while the second part of the train (from the derailed wagon onwards) moves to the lead track of the Bressoux fan of sidings. The two parts of the train separate and the brake pipe ruptures. This rupture causes an emergency braking, bringing both parts of the train to stop.



There are no casualties, but the accident caused extensive damage::

- to the track over a distance of around 2 km
- to the sixth and seventh wagons.

The investigator on duty of the Investigation Unit immediately goes to the site of the accident to make initial findings, gather information and take measurements.

Various measurements are taken on track A of line 40 in the Froidmont tunnel: no anomalies are detected as a result of these checks.

Moreover, the last check of line 40 by the measurement train was carried out less than 6 months before the date of the accident: no anomalies were detected following this check.

In order to operate on the railway network, any undertaking must request a train path. This request must be made several months in advance. Railtraxx introduced a request for its trains to be allowed to operate on the network, in particular between the Zeebrugge fan of sidings and the frontier point on line 24 towards Germany. The request of Railtraxx covered a long period (from 12/12/2021 to 10/12/2022) and provided for the possibility of "exceptional transport".

As a result, Infrabel imposed specific speed restrictions for exceptional transport, including a maximum speed of 10 km/h in the Froidmont tunnel.

The analysis of the data recorded on board the locomotive shows that the train reduced its speed and entered the Froidmont tunnel at a speed of around 10 km/h.

The investigation then focuses on the wagon concerned and its loading.

The various measurements taken on the wheels and their spacing are within tolerances, although the wheels of the first two bogies rolled in the ballast, which may have distorted some measurements.

A thorough visual inspection of the various parts and components of the wagon is carried out with the help of an independent external expert.

The maintenance history of the wagon is checked: according to the control sheets provided by the company Hupac, the various maintenance operations on the wagon were carried out as prescribed and the wagon underwent checks in accordance with the procedures in place.

The various checks carried out on the wagon do not reveal any part of the wagon that could have contributed to its derailment.

In principle, the weight per axle and wheel must be distributed equally. There are tolerances prescribed by the UIC. Using a calibrated and certified weighbridge, the weight per axle and per wheel is measured and it is found that there is a significant difference in the load distribution between the 2 wheels of the wagon for 4 of the 6 axles of the wagon.

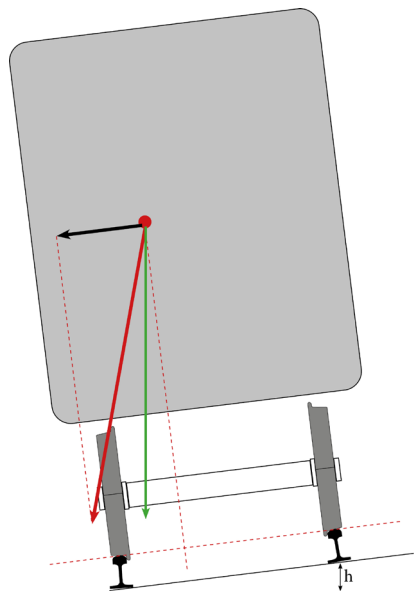
In addition to these imbalances, damage is found on the walls of the container transporting the cellulose bales: it is decided to check the condition of the load of the two containers transported by the wagon.

When the doors of the container transporting the cellulose bales are opened, it is found, in the presence of those directly or indirectly involved, that

- the positioning of the bales does not correspond to the loading plan of the procedure drawn up in accordance with Dutch regulations
- analysis of the debris shows that there are 3 empty pallets in the back of the container, whereas the procedure calls for 4
- the bales near the container doors are not secured
- the bales suffered extensive damage and are positioned against the left-hand wall of the container.

The decentered load in the container carrying the cellulose bales has an influence on the dynamic behaviour of the wagon, particularly in a curve.

In a curve, a wagon is pushed by the centrifugal force towards the outside of the curve, causing an imbalance between the wheels on the inside of the curve and those on the outside. To counteract this, a curved track is generally laid at an angle that depends on the radius of curvature: the outer rail is raised sufficiently so that each rail supports approximately the same wheel load. The difference in level between the two rails is called the "cant". The cant is calculated for a specified design velocity.



In the Froidmont tunnel, the curved track was laid with a cant (h) calculated for a design velocity of 90 km/h.

When running at low speed with a load not centred laterally (the cellulose bales are positioned on the left against the wall of the container):

- centrifugal force is not as high
- the resultant of the forces involved is directed towards the inside of the curve.

It is assumed that the incorrect positioning of the load of cellulose bales in the container contributed to the centre of gravity moving towards the inside of the curve. Consequently, the resultant of the forces caused the offloading of the right-hand wheels on the first bogie of the wagon, lifting the wheels and causing them to derail.

The second container carried by the derailed wagon is also checked: its load (of a completely different nature to that of the container of cellulose bales) was not damaged or altered.

The other containers filled with cellulose bales transported by the other wagons of the train arrived without damage at the final destination in Romania. Checks were carried out at this consignee: the load of the other containers complied with the established procedures.

The contributing factor of the derailment is the loading of the cellulose bales into the container, which is non-compliant with the procedures provided for.

After loading, the container doors were closed and sealed.

Once the container was loaded onto the wagon, the anti-opening plate on the wagon chassis prevented the container doors from opening.

Therefore, the railway undertaking cannot control the load of a container loaded on this type of wagon.

The Investigation Unit recommends the National Safety Authority to ensure that all those involved in rail freight transport (infrastructure manager, railway undertakings, shippers, consignors, etc.) engage in a process of reflection and analysis in order to identify the risks associated with the transport of potentially wrongly loaded wagons/containers and implement measures to limit the risks identified.

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

