

R2021-2, Derailment of a freight train in Vesanka on 3 July 2021, Summary

The six last wagons of a freight train that was transporting empty timber wagons from Jyväskylä to Alavus were derailed in Vesanka on the section of track between Jyväskylä and Haapamäki on 3 July 2021. No personal or environmental damage was caused by the accident. The track also sustained damage over a distance of approximately 1400 metres. The material damage of the accident amounted to approximately EUR 167,000 in total. Due to the clearance and repairs of the accident site, the section of the track was closed for railway traffic during 3–7 July 2021.

The section of the track had been renovated in 1997–2002. An incomplete layer of chippings had been added on top of the gravel support layer that provided a foundation for the track that was weaker than the current requirements. Recycled rails had been used in the refurbishment of the track, and a part of the drilling in their rail joints had remained imprecise. In practice, the strength properties of the support layer of the track had become even weaker than before. As a whole, the weakened support structure of the track, the poorly functioning rail joints and the wooden sleepers created a structure that was more vulnerable to the stresses created by train traffic and the forces of nature.

During the spring and summer of 2021, the Finnish Transport Infrastructure Agency had work done on replacing the sleepers as a part of maintenance of the section of track. For planning the work, walking inspections were carried out on the section of track in late winter and spring of 2021, in which the condition of the track was assessed visually and sleepers in poor condition were marked for replacement. During the inspections, the contractor noticed non-functioning rail joints in the section of track, which were reported to the agency that ordered the work.

In May–June 2021, the maintenance contractor started the work on replacing the sleepers on the section of track. In connection with the replacements, and during the mechanised tamping of the rails, the stability of the support layer of the track deteriorated. The work on replacing the sleepers was done during the period of hottest weather of the summer. Due to the hot weather, the aim was to carry out the sleeper replacement from 5.00 a.m. to 11.00 a.m.. The temperatures were monitored by measuring them, but the rail temperatures were not recorded.

The supervisors who managed the railway work monitored the progress remotely as well as on site visits twice a week. In practice, however, a track technician assigned to the task monitored the progress and quality of the work on replacing the sleepers at the worksite.

The derailment of the wagons was caused by two separate lateral movements that formed under the freight train, that is, track buckles¹. When the hot weather continued, the track support structure that had become weakened further due to the railway work was not able to provide sufficient support for the tracks. The rail joints that were in poor condition were not flexible enough when the rails heated, which also contributed to the formation of track buckles.

Track buckles were observed on the section of track before and after the accident. The track buckle detected during the railway work in mid-June was handled as a deviation from normal operations, and the ongoing work on replacing the sleepers was not interrupted. A new track buckle was observed on the day after the accident, but it did not cause a dangerous situation, because the section of track was closed from railway traffic due to the accident.

A track buckle always causes the risk of a serious railway accident. On tracks with a weakened support layer, the risk of track buckles increases due to the additional stress caused by the climate change on the

¹ When a steel rail expands due to heat and aims to force the rail loose from its attachment or move the rail sideways, it is called a track buckle.

structure of the track. Long periods of hot weather and larger amounts of rainfall will increase the challenges of track maintenance in the future.

In order to improve the safety of railway traffic and prevent accidents due to track buckles, the Safety Investigation Authority, Finland, issues the following recommendations:

1. The Finnish Transport Infrastructure Agency instructs that when preparing for railway work on the surface structure of sections of track where the support layer is weakened, the condition of the support layer and the rail joints should be examined and they should be taken into account in the planning, scheduling and implementation of the work. The ability of the rail to withstand lateral forces in particular must be verified in the final inspection.
2. The Finnish Transport Infrastructure Agency instructs that the rail temperatures should be recorded regularly and that the parties managing and monitoring railway work should monitor their development in real time and take measures, if necessary.
3. The Finnish Transport Infrastructure Agency clearly defines the criteria for interrupting railway work, the party responsible for the decision and the allocation of the costs due to the interruption.
4. The Finnish Transport and Communications Agency emphasises safety management methods when auditing the monitoring of deviations in everyday activities and the assessment and management of risks identified through them in addition to situations involving change.