



Safety recommendation no. 94

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Safety deficit	<p>On Saturday 25th April 2015, at 02:49, the five rearmost wagons of a freight train travelling from Basel to Lausanne-Triage derailed on the line between Éclépens and Vufflens-la-Ville in the vicinity of the municipality of Daillens (canton of Vaud). The train consisted of 22 wagons, of which 14 were laden with hazardous goods.</p> <p>Several hundred metres before the position where the derailed wagon came to a halt, part of the running gear detached from one of wagon 20's bogies. When passing over a switch shortly before a right-hand bend, the wagon derailed and was pushed out of the rails. Due to the resulting momentum, two wagons in front of wagon 20 as well as the wagon behind it all overturned, and the rearmost wagon's front bogie derailed. Wagons 18 to 21, all of which were laden with chemicals, rolled over onto their sides. While overturning, wagon 19's tank – which contained 25 tonnes of sulphuric acid – was damaged, and the contents spilled onto the ground next to the track. Due to the pushing effect of the two wagons that followed, wagon 20 rotated by approx. 180° before coming to a stop next to the track. Its tank was damaged and leaked approx. 3,000 litres of caustic soda. The direct cause of train 60700's derailment in Daillens is the loss of wagon 20's front-left axle bearing housing (axle box). The loss of this axle box is the result of a long process which began with maintenance work on the aforementioned axle box in August 2011. During this work, the castellated nut's retaining washer which fixes the bearings onto the axle journal, was not secured correctly. The castellated nut gradually loosened itself, which led, bit by bit, to the following damage: An increase in transverse stress on the axle box's rolling element, the intensification of axle 1's lateral movement and the occurrence of S-shaped pitting on the rolling surface of this axle's wheels, the fatigue and subsequent breaking of the left-hand leaf spring on axle 1. Ultimately, this damage caused the derailment of wagon 20 in Daillens.</p> <p>Currently, no regulations or consistent standards define a limit for the dynamic coefficient wheel load checkpoint (RLC). In addition, there is no existing catalogue of any possible irregularities which could form the basis for an appropriate notification. If a 'hot box' or a 'locked brake' is reported, the cause of the irregularity can be identified very easily. In comparison, as this accident shows, damage to the interior of an axle box may result in vibrations which do not noticeably increase the temperature of the axle box. For a transport company that does not recognise the elements which can underlie such a fault, it is difficult to interpret the fault and instruct appropriate measures. However, through a quick repair on the axle box that is subject to continuous wear, the risk that the bearing is destroyed or the wagon derails when the bearing jams or disengages can be significantly reduced.</p>

Safety recommendation

The STSB recommends that the FOT promotes the use of a system for measuring the dynamic coefficient, compiles a standardised technical basis for defined limits, and also compiles a catalogue of faults, thereby allowing transport companies to arrange appropriate inspection measures for incoming notifications.

Addressees	Bundesamt für Verkehr
Stage of the implementation	Implemented. As the system manager, the SBB has developed the foundations for the train control mechanisms and has defined limits for optimal, practice-oriented application. The system is continuously developed further and adjusted. From the FOT's point of view, the train control mechanisms currently deployed in Switzerland are at a high level. However, together with the system manager, the FOT will pursue additional development stages in this area, and discuss the results within the 'network access safety' working group of the railway safety commission (Kommission Sicherheit Eisenbahnen – KOSEB).
Investigation report concerning the safety recommendation	<u>Schlussbericht</u> <u>Rapport final</u>