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Energie und Kommunikation UVEK  
**Bundesamt für Verkehr BAV**  
Abteilung Sicherheit



AOB: Preliminary information based on the NIB CH interim report

## Gotthard freight train derailment accident



10.08.2023 (approx. 12:50)

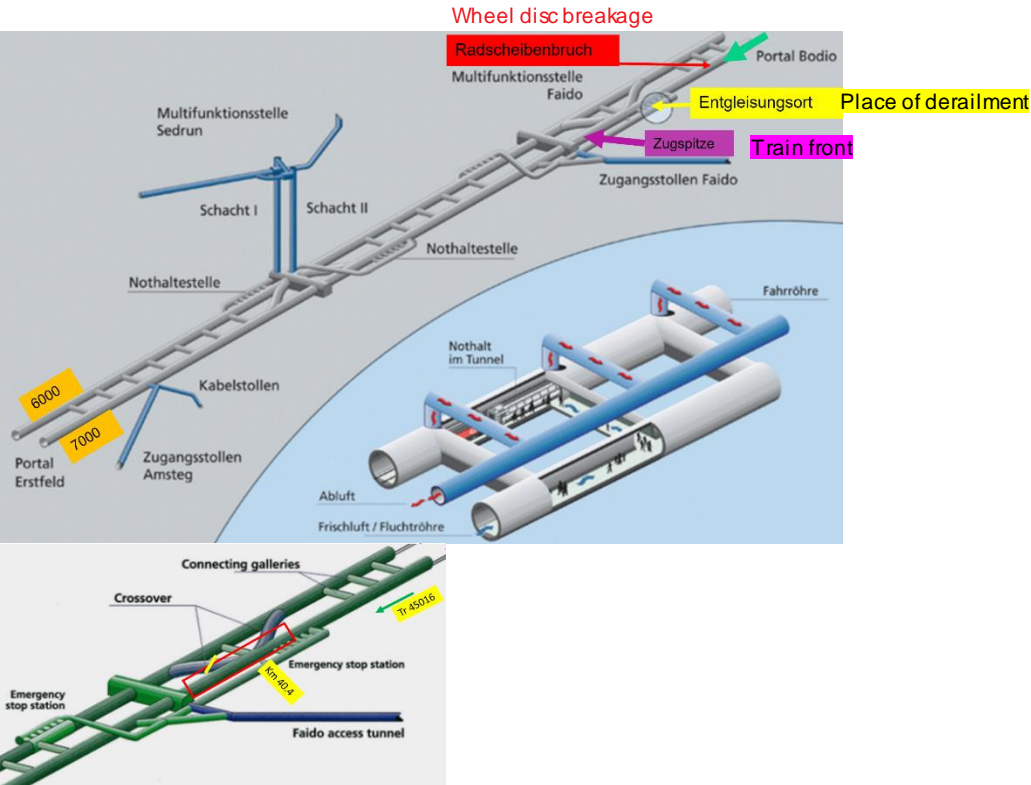


Ad-hoc NSA Network meeting 27.09.2023



# State-of-play: The accident dynamics

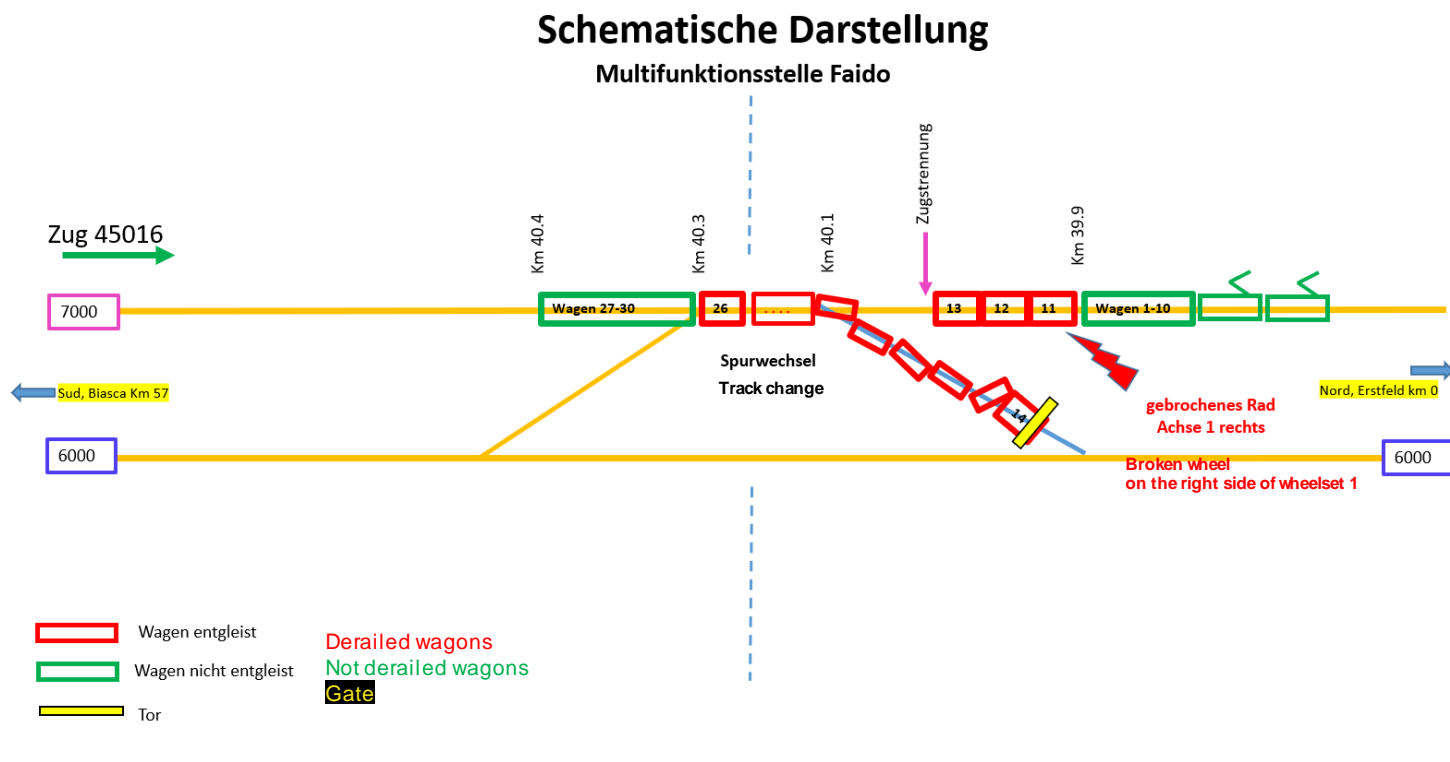
## Sequence of events:



- Freight train nr. 45016 operating under SBB lead was on its way from Chiasso to Basel with 2 locomotives (BR 185) and 30 freight wagons of different types
- Approx. 10km after entering the Southern portal of the 57km Gotthard Basis Tunnel, a fragment of the wheel disc of the first wheelset of the 11<sup>th</sup> wagon broke away in the direction of travel, followed shortly after by other wheel fragments → *damage to the infrastructure (bi-block concrete sleepers)*
- The wheelset continued to hang diagonally to the wagon → *the train ran further 4km without major material infrastructure damage*
- Approx. 17km after the tunnel portal another piece of wheel broke away and the diagonally derailed wheelset below the wagon (still attached) hit the sleepers and destroyed all switch drives before the Faido track change point
- Sixteen wagons derailed and partially overturned. The train got separated between wagons 13 and 14. Some wagons got onto the diverting track

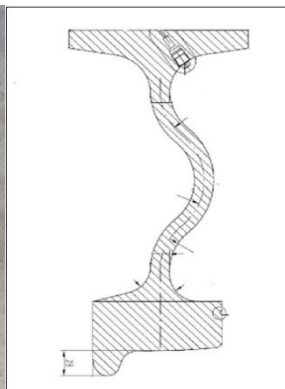


# Schematic illustration of the wagon positions after the derailment

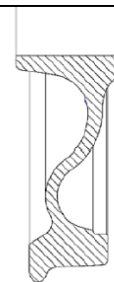




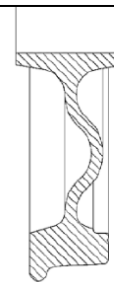
# State-of-play: Broken wheel



Riss im Radsteg  
BA314 / ZDB29 (mit  
Schräge unter dem Spurkranz)



Riss im Radkranz  
BA 004



Similarities identified with the "JNS broken wheels" types BA004 and BA314/ZDB29

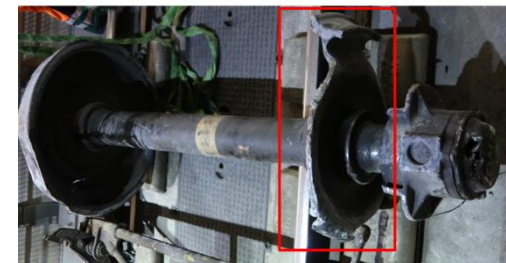
## Broken wheel: Type BA 390



Breakage on the running surface of the wheel through microscopic examination

- The wheel breakage occurred due to fatigue (vibration cracks) starting from cracks on the running surface of the wheel.
- The cracks developed into the wheel until a violent fracture
- Multiple cracks-more or less perpendicular to the surface- grew in parallel.
- The crack growth occurred over an extended period of time. The running surface indicates numerous further cracks

- Wheelsets and wheel discs are safety critical components which in event of default can lead to serious accidents
- Regardless of the cause of the wheel disc crack, once initiated, the crack grows slowly in the wheel continuously until the wheel is forced to break
- During technical train inspections in operation a crack can only be detected to a limited extent, depending on its extent and on the visible wheel area
- At this moment of the Interim NIB report publication, there are no indications of pre-existing operational deficiencies that could have led to the derailment



Missing wheel pieces on wheelset 1 (right side)

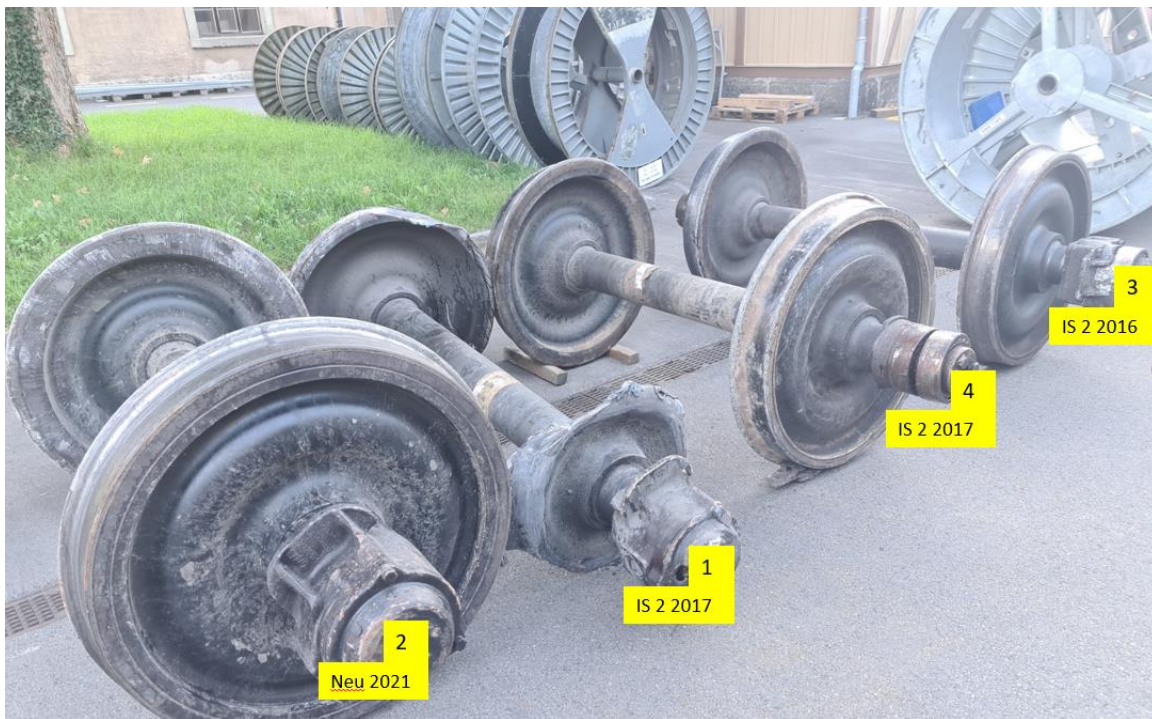
Wheelset 1 run in total 140.000 km since 2017 (since last level 2 maintenance)  
The wheel (with wheelset load 22.5 t.) was manufactured in 2018





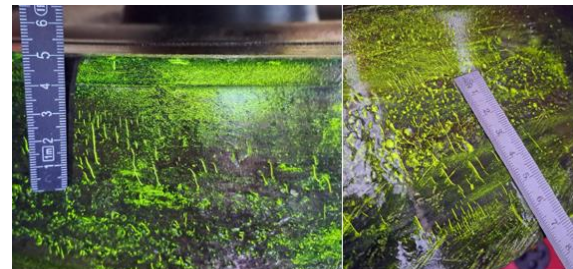
# State-of-play: Wheelsets

The 4 wheelsets of wagon 11 (466-2)\*



The other 3 wheelsets (2-4) were also analysed

- The ultrasonic testing found no volume defect in the wheel rims of wheelsets 2-4
- Linear indications (25-35mm length) were found in the axial direction around the entire circumference of wheelsets 2 and 3
- Isolated linear indications (approx. 15mm length) were found in the axial direction on the running surface of wheelset 4



Ultrasound magnetic particle testing of wheelsets 3-4

\*Keeper : Transwaggon (TWA)  
IS 2: maintenance level 2



# Next steps

- Immediate measures by the wagon keeper TWA: all concerned type of wheelsets (*approx. 150*) were withdrawn from operation
- 19.09.23: The preliminary results of the metallurgical examination were presented to all stakeholders
- 21.09.23: NSA CH informed the JNS about the preliminary results of the metallurgical examination of the concerned wheel-type BA 390 and its similarities with the JNS “broken wheels”
- 28.09.23: Foreseen publication of the NIB interim report
- Safety alerts are introduced in parallel by NIB CH to SIS and by the wagon keeper TWA to SAIT
- FOT (NSA CH) is making stakeholders aware at national level of the publication of the NIB interim report and will inform them that the safety measures according to the conclusions of the JNS “broken wheels” should be extended to wheel-type BA 390
- 06.10.23: NSA CH and all stakeholders involved will discuss with the JNS “broken wheels” group in order to decide on the appropriate JNS procedure and next steps