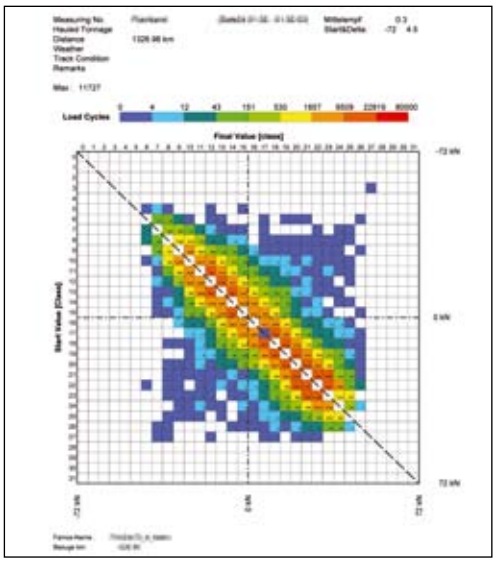
Determination of operational loads at the OTU Øresund train

OTU Øresund train during a test run at Gävle (Denmark)

Measuring equipment at the bogie

Customer Requirement

The ratings of the components are heading more to the limits of the constructive reserves in comparison to the load assumptions. At the same time the stress on the components is increasing due to an increased use of the vehicles in payload and revenue service program. Consequently additional verification of the design under operating conditions is required. PROSE was contracted to determine the operational load collectives at the driven and non-driven axles as well as on the motor and the trailing bogies of the OTU Øresund train.



The life expectancy is derived from the Rainflow matrix

Realisation

More than 100 measuring signals (accelerations, stresses, forces and movements) were continuously recorded during the measurements on the Øresund train. PROSE has developed tools to evaluate the mass of measured data. The challenge is to retain only the relevant information and greatly reduce the data volume. Load assumptions and life time predictions are derived out of Rainflow-classing diagrams.

Customer Advantage

The vehicle supplier receives the security that the train is correctly designed and that the life expectancy is achieved. Problems are preventively discovered and can be corrected through minimal servicing, before the train has to be taken out of service for corrective actions. More over the manufacturer gains experience in properly choosing the load assumptions during the design phase. This is achieved by closing the circle from load assumptions over real measured operational loads back to the load assumptions.

Factsheet 2.00007

References

- **VR Sr2 (Finland)**
  Measurement of operational load collectives with Hot-Spot-method
- **NSB Emu Class 72 (Norway)**
  Measurement of operational load collectives at running and trailing axles and different bogie components*
- **Articulated Railcar Hessische Landesbahn (Germany)** and **Narrow Gauge Articulated Railcar Chemins de fer du Jura (Switzerland)**
  Measurement of operational load collectives at the motor bogie
- **SBB Re 482 (Switzerland)**
  Measurement of operational load collectives at the bogie
- **Commuter train CP 2000 (Portugal)**
  Measurement of operational load collectives at the carbody articulation above the Jakobs-bogie and at bogie components
- **Tramway Cobra, Zurich (Switzerland)**
  Measurement of operational load collectives at an axle gearbox and its surroundings in a low floor motor bogie

* see:
Design of wheelset axles – verification of load assumptions by dipl. Ing. HTL August Kläger, Bombardier Transportation and dipl. El.-Ing. ETH Stefan Bühler, PROSE AG; ZEV Glasers Annalen no. 5/2003

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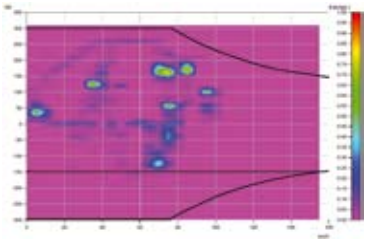

A single run can be characterised by a two-dimensional histogramm in the speed-traction effort diagram.

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