



ESAH – Diagnostic technology: electronic systems analysis at frogs

DB Systemtechnik

Cooperation and development partnerships with industry and research institutions:



Boosting infrastructure availability:
ESAH - Track
diagnostic technology

Why ESAH?

Wear on switches is influenced by a number of factors, mainly through:

- material
- design
- track layout
- track substructure/superstructure
- vehicle

ESAH allows users to evaluate the effect of these factors on the overall condition of the switches under real dynamic load conditions.

When ESAH?

- **Maintenance (preventative or corrective):** servicing, inspection, repair and upgrading
- **Quality assurance:** acceptance of new frogs, evaluation of maintenance measures
- **Evaluation of load on rails and frogs:** short-wavelength impacts on welded joints, insulated rail joints and rail short pitch corrugation or squats
- **Maintenance planning:** efficient use of material and capacities
- **Noise mitigation:** assessment and reduction of noise emissions

DB Systemtechnik has developed an efficient and cost-effective diagnostic system for monitoring and assessing the condition of rails and switches. The track-side inspection of switches and vehicle-based monitoring of infrastructure during scheduled operations allow large areas of infrastructure to be maintained efficiently.

How ESAH can help you

- Increased service life and availability of switches through corrective maintenance of transition geometry
- Reduced track maintenance and investment costs
- Greater safety during operation thanks to early identification of inadmissible wear at frogs
- Detection of changes in track guidance at switches

We are happy to provide you with expert and objective advice and support

- Design and planning of your individual switch maintenance system
- Selection of the required track diagnosis product
- Installation and operation of measurement equipment
- Transfer and analysis of measurement data
- Evaluation of results and projections of component behaviour so that you can get the most out of condition-based maintenance (CBM)

- **DB Netz:** Condition diagnosis on high-maintenance switches, assessment of repair quality on frogs and intervention thresholds for repair using ESAH-M, comparison of ESAH technology with alternative systems
- **Switch manufacturers:** Improvement of frog transition geometry using ESAH-M technology
- **ProRail:** Use of ESAH-M technology for improving switch maintenance since 2010
- **Banedanmark:** Use of ESAH-S technology on the Copenhagen railway network since 2015
- **Use in innovation projects:** Low-maintenance switches and crossings, frog test track at Haste near Hanover

Imprint

DB Systemtechnik GmbH
Materials and joining technology

Bahn Technikerring 74
14774 Brandenburg-Kirchmöser,
Germany

Dr Andreas Zoll
Phone +49 3381 812 308
andreas.zoll@deutschebahn.com

Hassan Benaich, Manager Sales
Phone +49 89 1308 5450
hassan.benaich@deutschebahn.com

Details subject to change
without notice
Last modified August 2018
www.db-systemtechnik.de

ESAH – Mobile



ESAH – Mobile

Temporary local load analysis for all kinds of frogs during ongoing operation:

- Recording of short-wavelength impacts on the frog at three levels:
 - Monitoring of wheel transition at the frog to improve transition geometry
 - Assessment of frog wear and load on the component structure and ballast
 - Measurement of sleeper subsidence (voids under sleepers) at the frog

- Setting and improvement of intervention thresholds and measures for condition-based switch maintenance
- Identification of potential improvements on the entire component or wheel/rail system (material, design, transition geometry, track geometry)

Technical features

- Fast system assembly (< 5 min), ready for operation immediately
- Measurement results shown on device display for ad-hoc condition evaluation
- Data saved in the device and collected in the cloud

ESAH – Stationary



ESAH – Stationary

Permanent local analysis of sleeper subsidence on all kinds of frogs during ongoing operation:

- Measurement of sleeper movement (voids under sleepers) at the frog section:
 - Monitoring of compliance with the set limit for voids under sleepers, including in high-speed traffic
 - Use on moveable frogs, for example, in order to prevent damage to CCS components as a result of increasing dynamic forces due to inadmissible voids under sleepers

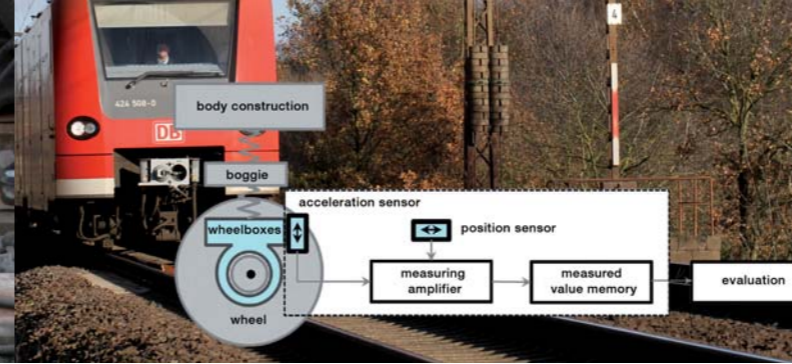
Technical features

- Fast assembly and disassembly for maintenance, ready for operation immediately
- Railway-compatible component design, suitable for high-speed traffic
- Vertical measurement precision (z) of ≥ 0.2 mm
- Data saved in the device and collected in the cloud



All photos: Dr Andreas Zoll

ESAH – Vehicle



ESAH – Vehicle

Permanent load analysis for rails and all kinds of frogs through regular trains:

- Recording of short-wavelength impacts on switches and rails in the track:
 - Monitoring of wheel transition at the frog to improve transition geometry
 - Load calculation and determination of wear condition
- Setting and improvement of intervention thresholds and measures for condition-based maintenance of switches and rails
- Component failure projection including specific failure probability based on history

Technical features

- Continuous line monitoring through regular traffic (regular scheduled trains), no dedicated inspection vehicle necessary
- System can be individually adapted to vehicles used
- Visual assessment of the rail surface and verification of rail defects via camera-based image recognition
- Transfer of measurement results to the cloud for ad-hoc condition evaluation

ESAH – Tram



ESAH – Tram

Temporary or permanent load analysis on all kinds of rails and frogs in tram networks:

- The ESAH-M,
 - ESAH-S and
 - ESAH-F
- modules can also be used in tram networks, following adjustments to the evaluation algorithms.

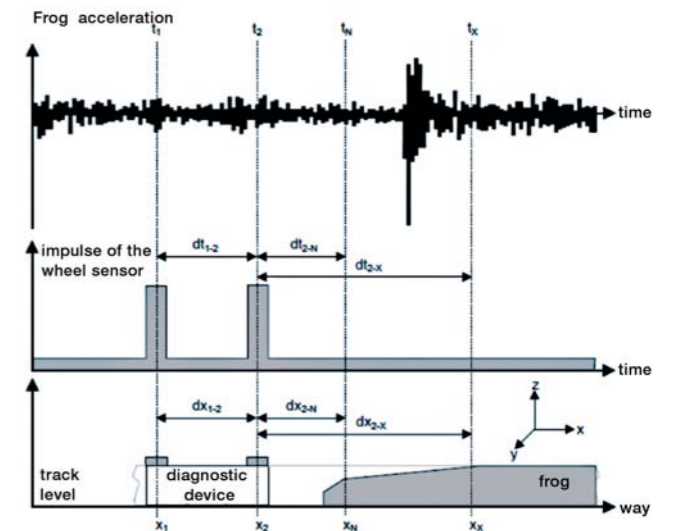


Photo: René Heyder