RHOMBERG SERSA / vossloh

THE MOST IMPORTANT CONTACT
IN THE ENTIRE RAIL INDUSTRY

Rad Schiene
SYSTEMSERVICE

WHEEL/RAIL - SYSTEM SERVICE

RAIL TRANSPORT – A SYSTEM INTEGRATION OF VEHICLE AND INFRASTRUCTURE

The interaction of wheel and rail

A perfectly matched wheel/rail pairing enables safe, reliable and low-wear railway operation over the long term. Such coordination of the vehicle and track dimensions that are essential for running characteristics is required by Section 35 (1) of the German Ordinance on the Construction and Operation of Tramways (BOStrab) to ensure safe guidance and the greatest possible running stability – even by reaching the permissible wear conditions of all components.

Even the slightest changes to wheel/rail geometry can have significant effects on operational safety, vehicle behaviour and wear:

- Individual measures always affect/impact the overall system.
- The wheel/rail interface is particularly affected by this.
- The frictionless functioning of this interface requires interdisciplinary cooperation across all relevant fields, and
- makes continuous cooperation between vehicle and infrastructure departments essential.

Analysis and optimisation

A well-matched contact geometry initially manifests itself in straight track through single-point contact with a large contact area: the contact point remains stable on the running surface, and the contact ellipse is large and well formed. A key factor is the width of the swept contact area – the area of the rail head actually traversed by the wheel during lateral wheelset movements in service.
A wide swept contact area distributes the load input evenly across a large rail cross-section, reduces local contact stresses and provides the geometric basis for all complementary measures – from optimising the material pairing to effective rail-head conditioning.

The result is a highly shape-stable contact condition: the profiles wear evenly, remain geometrically compatible and develop pronounced resilience against rolling-contact-fatigue damage mechanisms such as head checks and squats.

Wheel/Rail System Service

Safety, ride comfort and cost-efficient maintenance in urban rail transport share a common basis: an optimally matched wheel/rail system.
Rhomberg Sersa Vossloh GmbH supports tram, light rail and metro operators in systematically exploiting this potential – based on many years of practical expertise in wheel/rail guidance and an independent methodology that treats both system partners as equal.

Wheel/Rail Balance Audit – neutral, robust, actionable
A wheel/rail system audit analyses and evaluates wheel and rail as inseparable system partners. Experienced specialists assess whether existing transversal dimension requirements and wear tolerances correspond to the actual operating profile, identify optimisation potential and derive specific recommendations for action – always with the objective of developing the overall system holistically and sustainably.

Results that make a difference in operation:

- Optimised lateral dimensions and graduated wear tolerances as the basis for rule-based, inspector-independent assessment
- Regulatory requirements in a clear, directly applicable form
- Robust documentation as a basis for inspections, maintenance planning and evidence to transport authorities.

SERVICE PORTFOLIO

OUR SERVICES

Wheel/Rail – Matching

- Practical wheel/rail system audits
- Derailment safety assessment
- Verification of geometric compatibility
- Matching of transversal dimension geometry
- Definition of wear and operation tolerances
- Optimisation of the wheel/rail pairing
- Improvement of crossing (frog) transfer area
- Assessment for rail reprofiling (milling & grinding)

Turnout procurement (Design)

- Design-based alignment analysis and optimisation in accordance with DIN EN 17636
- Feasibility studies for special turnout designs
- Manufacturer-independent design assessment and consulting
- Preparation & review of technical documentation (FAT, operation, maintenance)
- Seminars and training on wheel/rail guidance and turnout technology

The use of 3D modelling and simulation makes the analysis results particularly realistic and clearly comprehensible, including non-specialists in the matter. Visual tools provide the basis for directly implementable optimisation measures with clear technical and economic benefits for our customers.

WHEEL/RAIL SYSTEM AUDIT

THE MOST IMPORTANT CONTACT IN THE ENTIRE RAIL INDUSTRY

The key findings of current DZSF research projects confirm that the optimal contact geometry of the entire wheel/rail system is crucial.

This leads to important recommendations for infrastructure operators like:

1. Monitoring contact geometry regularly.
2. Grinding rail profiles in a targeted manner.
3. Condition-based reprofiling of wheel profiles.
4. Analysing wear development digitally.
5. Integrating contact geometry into asset management.

Our department Wheel/Rail System Service supports you in implementing these recommendations, based on many years of practical expertise in wheel/rail guidance and a methodology that treats both system partners equally. Those who control contact geometry reduce wear, extend service life and sustainably lower maintenance costs.

A first step is a wheel/rail system audit in which experienced specialists analyse wheel and rail as inseparable system partners. The audit reviews existing lateral-dimension requirements and wear tolerances, identifies optimisation potential and derives specific measures – always with the objective of sustainably developing the overall system.

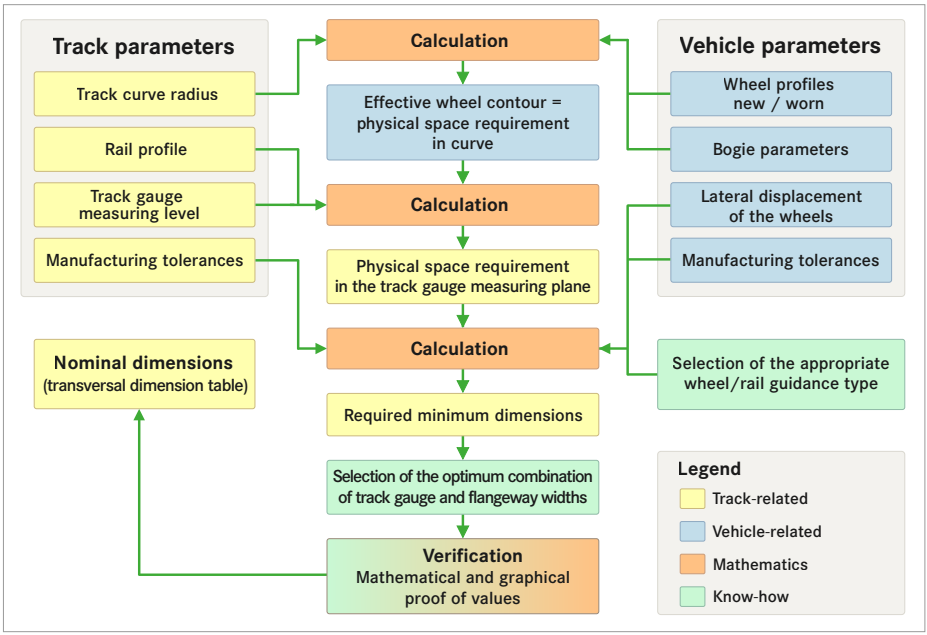
RSV also supports the dimensioning and configuration of new track and turnout installations with alignment analyses, feasibility studies, manufacturer-independent consulting and design, through to the preparation and review of technical documentation for acceptance, operation and maintenance.

NOMINAL DIMENSIONS & WHEEL/RAIL GUIDANCE

DESIGN OF TRACK INSTALLATIONS

Everything starts with the correct dimensions. Optimally specifying track gauge and flangeway widths lays the foundation for track/turnout installations that operate safely, provide good driving conditions and have a long service life.

Optimally designed transversal dimensions are the result of our calculations and analyses, based on many years of practical experience in turnout design, manufacture and maintenance. The comprehensible 3D visualisation of the results benefits specialists and non-specialists alike.



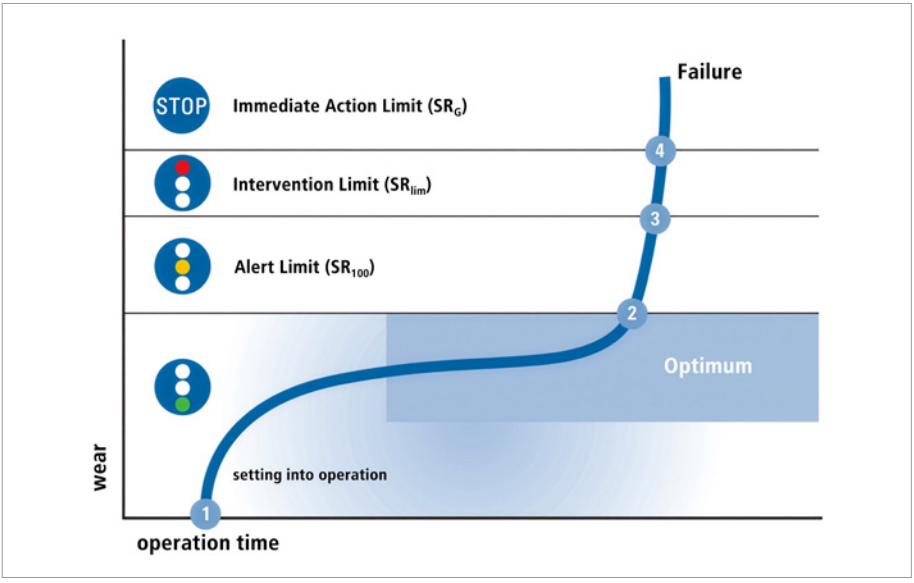
Track and vehicle data serve as input parameters for calculating transversal dimension tables.

ASSESSMENT & PRIORITISATION

DETERMINATION OF TOLERANCE AND WEAR LIMIT VALUES

For automated assessment and evaluation of measurement results in nominal-versus-actual comparisons, clearly defined tolerance requirements are essential. Only the use of realistic and differentiated operating tolerances allows solid evaluation of measurement results – both with regard to safety-related effects and economic efficiency.

The determination and maintenance of graduated tolerance limits are integral components of our wheel/rail guidance investigations and transversal dimension tables. The resulting level system – from the preventive observation threshold to the safety-critical intervention threshold – provides the technical and rule-based foundation for differentiated assessment, clear prioritisation of measures and a predictable, cost-efficient maintenance strategy.



Three thresholds, four states: the SR tolerance levels show when observation, intervention or stopping is the appropriate action.

SpurKranzTaster (SKT) during a check of the contact conditions between crossing nose and wing rail

Practical contact analysis, investigation of component wear behaviour and service-life optimisation of wheel and rail are among our core competencies.

The SpurKranzTaster is a mechanical inspection gauge for simulating flange passage and identifying contact marks in track installations in accordance with BOStrab.

The test body of the SpurKranzTaster geometrically represents the relevant outer scope of the standard wheel flange, i.e. the section of the flange contour that comes into closest contact with the track guidance geometry in operation. The characteristic longitudinal shape of the test body (cigar-shaped cross-section) corresponds to the flange segment derived from the standard wheel transverse profile and rotationally symmetrically cut to its maximum engagement extent.

The geometry of the test body is manufactured specifically for the transportation company and corresponds to the currently valid, approved version of the client's standard wheel transverse profile.

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