ÖBB INFRA

Innovations for the railway-Infrastructure

Main tasks

- strategically research for the „ÖBB-Infrastructure AG“
- networking of industry, economy and universities to develop ideas and possible solution statements
- inspection of international, national and/or regional research projects for our customers
- International, national and/or regional focused Research transactions for our employers and customers with the target of analysis and examination.
- Focusing on technical railway system–know-how to strengthen and position the system railway as an engine of innovation.
- support in processing research projects (research funding)
- Gaining of research grants (national and international).

Main focus of Research & Development

The R&D of the „ÖBB-Infrastruktur AG“ does application-oriented research.

With the help of national and international

- Research institute
- industry
- Operators of Railway infrastructure

ideas are successfully turned into reality.

Pilotinitiative VIF 2011

- BMVIT, ASFINAG, ÖBB Infrastructure AG and FFG
- endowment: **4 million euro**
- time schedule
  - advertisement October 2011 – January 2012
  - Q1 2012: Jury decision, contract design, project start: May 2012
  - Project realization at the latest till end of April 2014.

Instrument	PCP	F&E service
financing	100%	100%
run time	6 month (step 1) 15 month (step 2)	12 – 24 month (depending on topic)
cooperation	possible	possible
budget	**2 Mio. €**	**2 Mio. €**

Pilotinitiative VIF 2012

- BMVIT, ASFINAG, ÖBB Infrastruktur AG and FFG
- endowment : **4 Million Euro**
- time schedule
  - advertisement October 2013 – February 2013
  - High interest, proposals amounting to 11,8 Mill.€ came in
  - Project start: June 2013
  - Project realization at the latest till end of 2015.

Instrument	F&E Dienstleistung
Financing	100%
Run time	12 – 24 Month (depending on topic)
cooperation	possible
Budget	**4 Mio. €**

F&E Projektüberblick

Currently about 60 projects are from different sectors of infrastructure, for example,

SMILE

Laserscanning

Blick-EK

Brücken-klappverfahren

Götterbaum

Wiener Bogen

Loponode

Lärmschutz

Gleislage-Charakterisierung

Argos®

dRail

RSS

eMORAIL

Naturgefahren-Radar

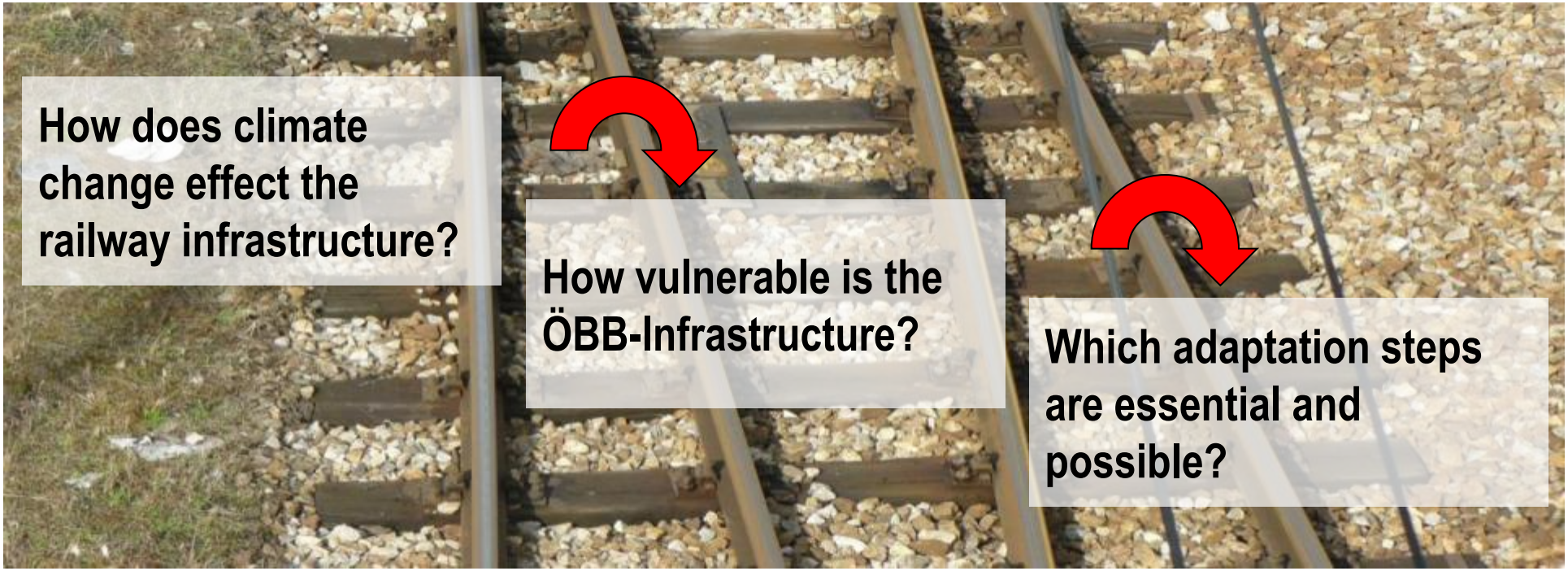
SENS - KM

KLIWA

EcoRailNet

Petroscope

ÖBB Infrastructure and climate change



The adaptation of the ÖBB-Infrastructure AG don't have to be expensive – many of the already excising activities could be adapted, that they can adjusted for the climate change!

Kreosot-alternative

- “Biozid” product law (BGBl. I Nr. 105/2000) is background of ban of Kreosot for impregnation of sleepers in the future
- Survey and rating of alternative impregnators and impregnation methods

Result:

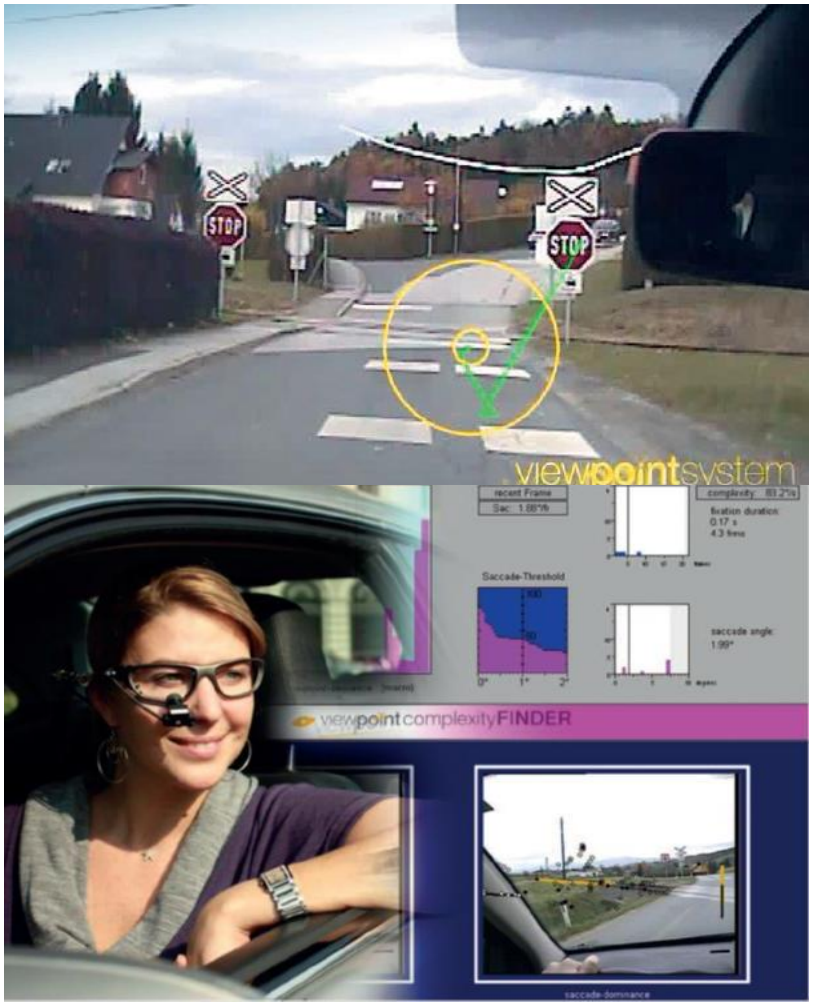
- List of substitutes respective wood modification methods to preservation of sleepers
- Rating of requirements of impregnation substitutes for sleepers
- Notification of several important advancement (→ continuance in the meanwhile at VIF 2011)

Blick-EK

- level crossings are a challenge for car drivers.
- unclearance or routine are the reasons for heavy car accidents on these crossing points of road and rail.
- The limits of perception for drivers at level crossings were explored.

Result:

- Recommendations for specific, cheap and reasonable measures to improve the perceptibility of level crossings.

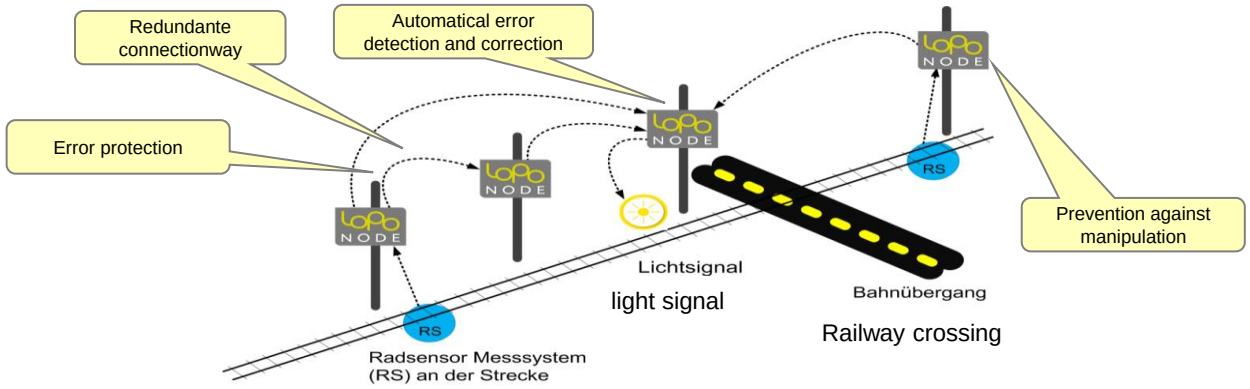


Loponode Proof-of-Concept

The projects aim ist to develop a technology, which makes it possible in the future to distribute information's wireless and save.

- With the use of coordinationsmiddleware, it´s possible to configure Systems and scenarios very easily without any changes in the hardware.
- With the combination of the coordinationsmiddelware and low power nodes, it´s possible to ensure continues data communincation for various use-cases.

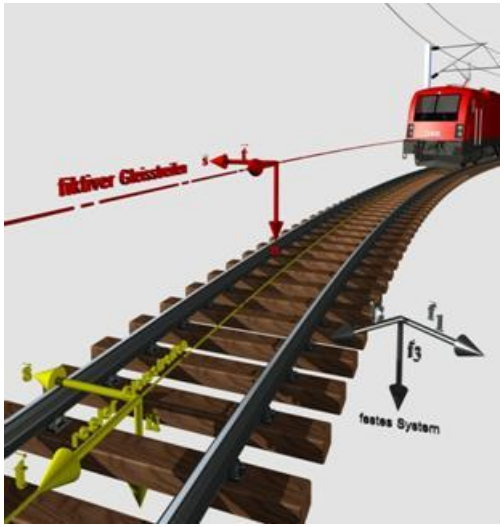
The use-case “railway crossings” exemplifies the options and possibilities this technology provides for the future of railway crossing technology without any installed cables in the ground.



Der Wiener Bogen©

The revolutionary Austrian development of track line design

The Wiener Bogen© is a new method for an optimised and enduring track line design.



Aim:

- More comfort for passengers
- Low forces and subsequent low wear of the track.
- less maintenance necessary
- cost savings (as part of scheduled maintenance)

The railway trace is a long lasting part of the infrastructure. The right design of the track has important effects on maintenance costs of the infrastructure in the curved tracks, as well as the railway vehicle, for many years.

Innovationrun Vienna–St.Pölten

Innovationrun Vienna–St.Pölten

Confirmation of possibility to go with 250km/h by mixed traffic.

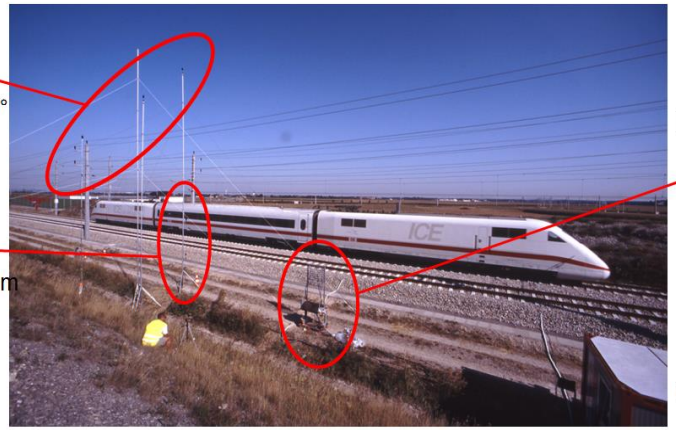
additional project targets are:

- superstructure at high performance track
- check of ballast flying
- effectivity of mass-spring system
- Measurements at the overhead contact line
- aerodynamic influence caused of trainpass
- Beside noise barriers on free track and escape doors in tunnels
- mechanic stress on signal poles
- acoustic noise analysis
- measuring on access door systems of the railjets

Acoustic emission at highspeeds

Noise measurements of (highspeed-) train run with maximum speed of 330 km/h on the new build line ‘Tullnerfeld’ within the Innovation measuring drives 2012

Messquerschnitt 22 – km 28,100:



Results:

- Measuring of acoustic rail roughness and track decay rate in relation to the limits: acoustic rail roughness acceptable to the TSI limits, track decay rate mostly acceptable, just a few frequency bands outside of the limits.
- measurements positions of ON S5026 & EN 3095 show perfectly well calculated values corresponding ONR 305011 for v<200km/h; at v>200km/h are measured values are partially significant below the calculation of ONR (for RJ: - 3dB at 200 km/h; for ICE: - 6 dB)
- Microphone-Array shows that the rolling noise is dominant for all speed levels (to v=330 km/h) (without noise barriers)
- Share of noise levels for emissions height 2,5/4/5m increases from speed of 230 km/h upwards.

Reflex-Bahn

Verification of the existence of reflections between noise barriers and running trains

- Forecast values according to the Austrian standard ONR 305011 (model calculation)
- Confirmation by measurement comparing with/without barrier.

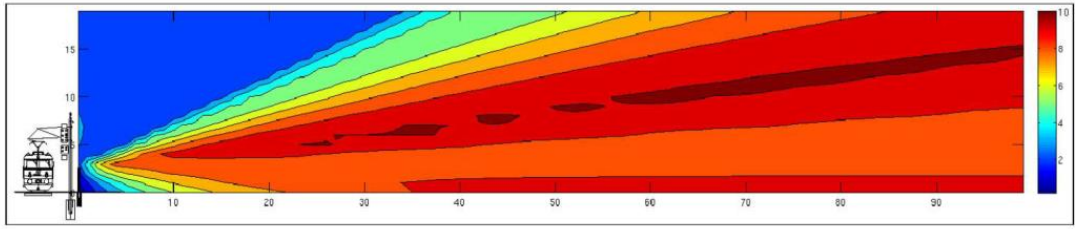


Abbildung 5 ist eine Differenzkarte zwischen reflektierender und absorbierender Lärmschutzwand nach Berücksichtigung der Reflexionen durch eine Ersatzschallquelle auf Höhe der LSW. Der weitgehende Verlust der Einfügungsdämmung führt zu ausgeprägten Pegelerhöhungen im gesamten Bereich des „Schallschattens" mit einem Maximum entlang einer gedachten Linie von einer Emission im Bereich des Zuges über die SOK.

Graph ‚hypothesis for measurement' which could not be verified by measurement

Results:

- In the close-up range area (up to 30 meters) no increase of the noise level because of interreflection could be detected.
- In the area below 1000 Hz an increase of the level in some octave bands through interreflection is possible.

Petroscope – automatical stonecheck

Classification of stones with spectral analysis

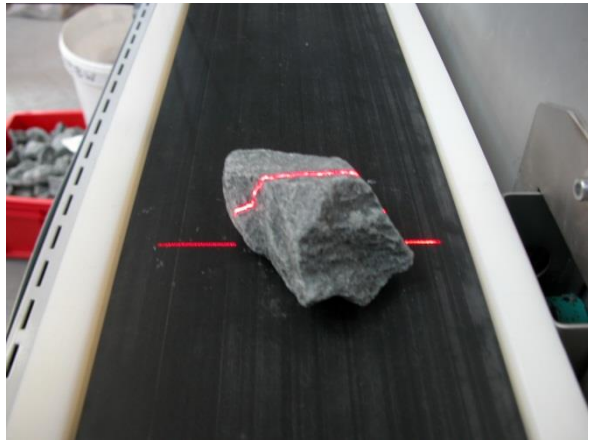
- Check with database
- Acquisition of impurity
- …

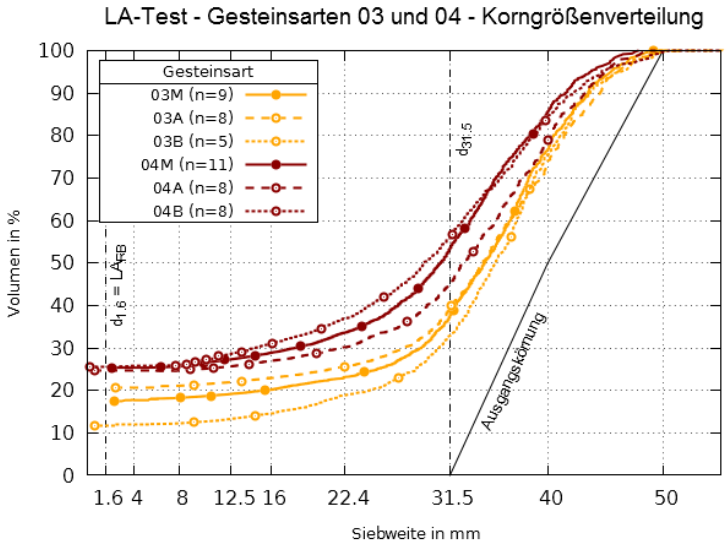
Ascertainment of stone parameters

- Grain size
- Degree of roundness
- Grading curve
- LA-parameter
- …

Implementation in

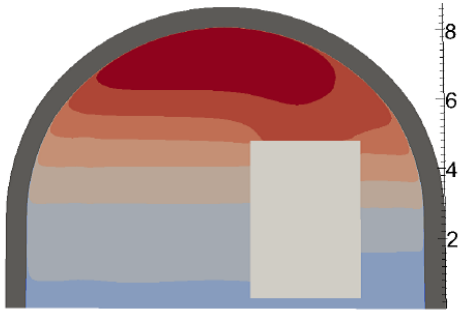
- ballast
- tunnel excavation
- …

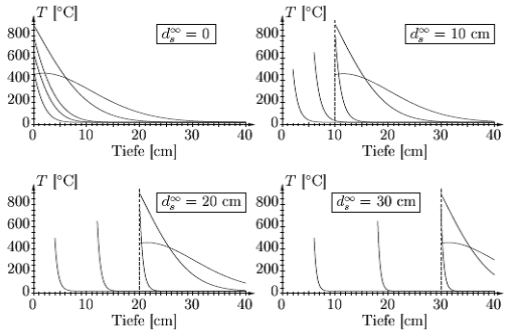




Fire can cause serious damage to the constructions!

That's why it´s important, to construe frameworks and constructions for this kind of stress.





Actual standards don`t include the real material behaviour.

- With fire tests the material is tested exactly
- Developing new, calculation method which are close to reality.
- Numerical simulation of the fire behaviour and comparison witch the test result

The results are used to adapt the dimensioning tools and actual standards and regulations

FTBB – prefabricated girders in bridge building

Reinforced concrete for semi precast elements on bridges

- Pros: accurately fit, high quality, reduced construction period
- challenge: horizontal joints, transport

Verification of the ability for large scale tests

- dimension and production of the test beam
  - bend und torsion test
  - Long term test to creep characteristics

Result: usage possible in general

details are about to get analysed

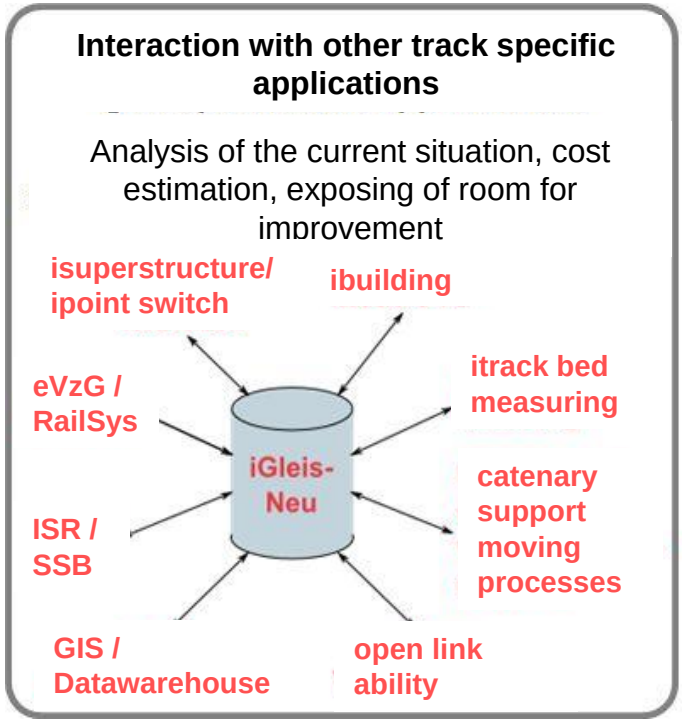
feasibility study igleis-new

igleis deals with the whole track measuring process, data processing, machine controlling and quality control

- igleis has to be renewed because of technological obsolescence
- Targeted is the collection of actual technical and administrative requirements for a modern igleis-System, e.g.
  - IT-system-specification
  - interfaces
  - Integration of new track inspection systems

Result:

- Requirement description ("technical specifications") for igleis-new

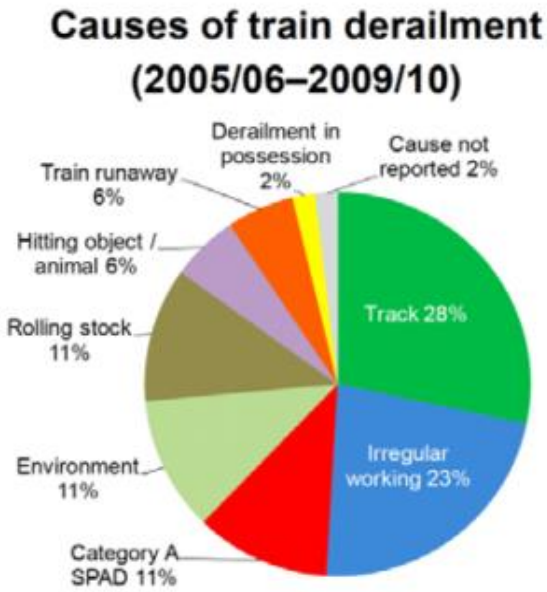


D-Rail

In this EU aided project, the causes of train derailment – especially when there is an interaction of small independent failures, which cause the derailment – and their avoidance are analysed

Result:

- Consistent limits and train vehicle identification in Europe
- Reduction of not conform, excessive use of the infrastructure
- Contribution to the prevention of technically caused derailments



Causes of derailments in UK.

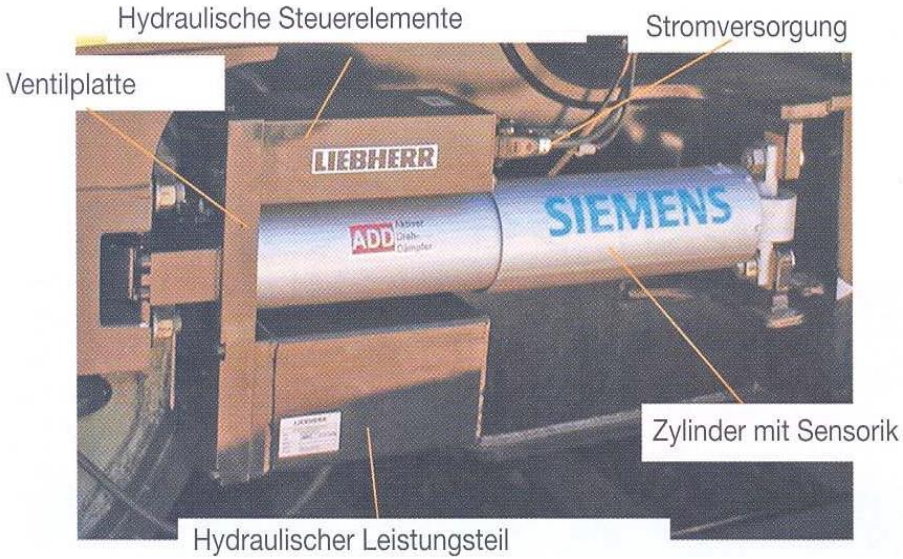
ADD-IT

The influence of installed active rotational damper (ADD) in the design series 1016 should be ascertained.

The focus lies especially on a possible wear out decreasement in tight arcing. Therefore Taurus get equipped for testing with ADD and technical attendance. Comparing abrasion tests on the pair of wheels are intended as well as analyses of the wheel rail forces with equilateral test points.

Results:

- Effects of the ADD are documented
- Potential cost savings during the maintenance of the locomotive can be estimated.

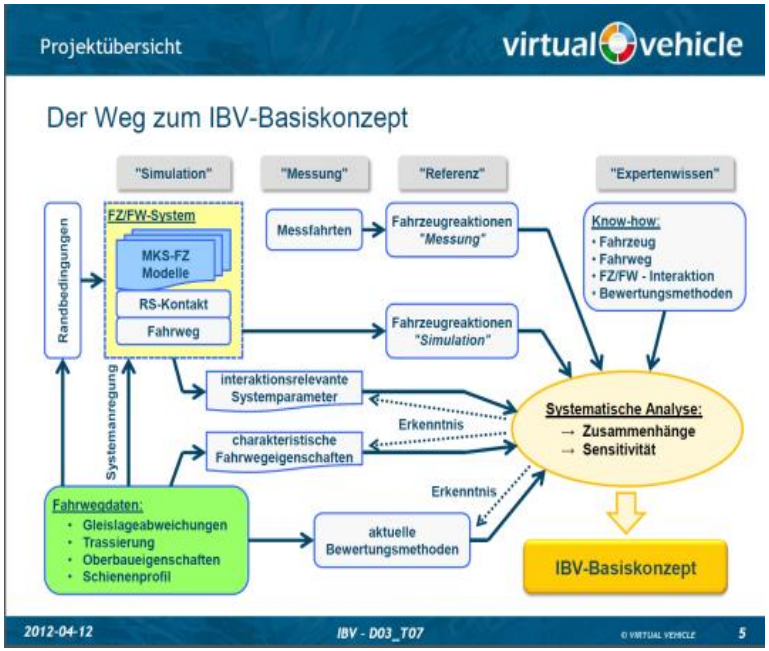


Picture-verification: ETR April 2007

IBV – Interactions rating system

This project is concerned with describing the parameters and quantification of the interaction between Train and the communication track due to special train and communication track quality.

- Determining the parameters used for the description of the interaction.
- Modelling of Trains and communication track
- Development of an interaction model analogical to the real operating conditions



Result:

There should be a method, which rates and classify the interaction of Train and communication track, which is a basis for a prediction of the temporal changes of the train condition. Thereby the communication track maintenance could be optimized.

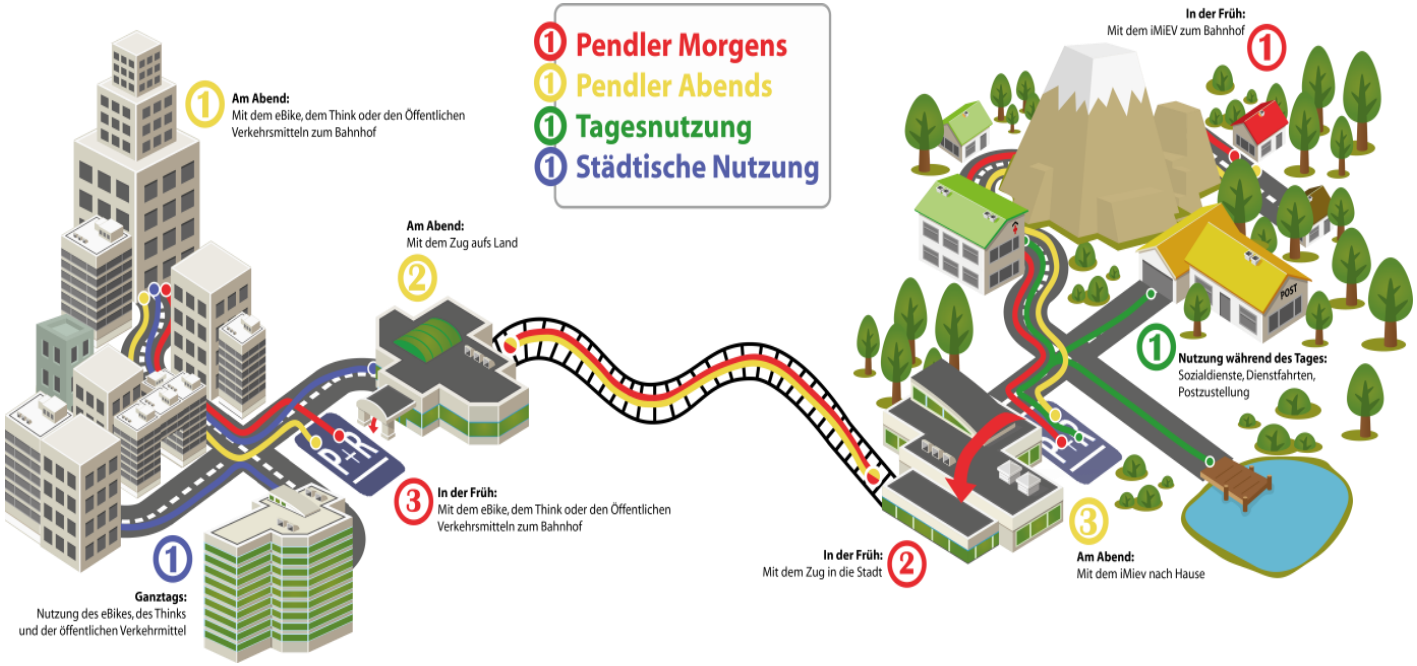
Argos®

Intelligent infrastructure-facility for reliable capture of the running behaviour at high speeds

- Early, objective cognition of derailing risks
- Safe operation caused by continuous interception of technical limits with very high accuracy
- Cost reduction due to status orientated maintenance of vehicles
- objective basis for payoff of infrastructure using fees
- The measurement system does not affect the infrastructure-maintenance process.

conception of an innovative, cheap and environmentally friendly mobility solution for commuter

- business model assessment, that provides users an ÖBB-Ticket, an e-car at home as well as an intermodal e-sharing offer at the target.
- Pilot tests in two rural regions (NÖ, Stmk) as well as in two cities (Wien, Graz)



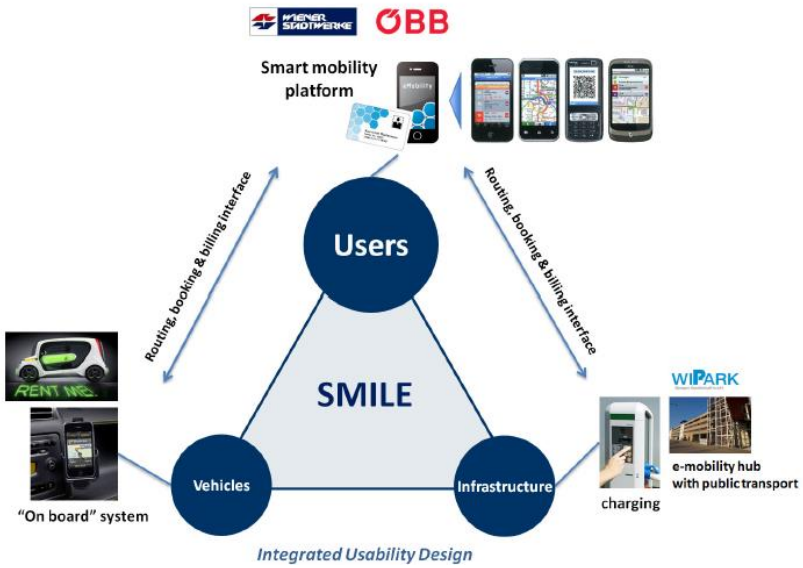
SMILE

Development of an prototype of an integrated multi modal information, booking and payment system

- Links individual e-mobility offers with the public traffic.
- From the user´s perspective: consistent usability and continuous guidance system
- cooperation of the two biggest mobility provider: ÖBB and Wiener Linien

Result:

Creation of a basis for a prospective Austrian wide “smart mobility platform”



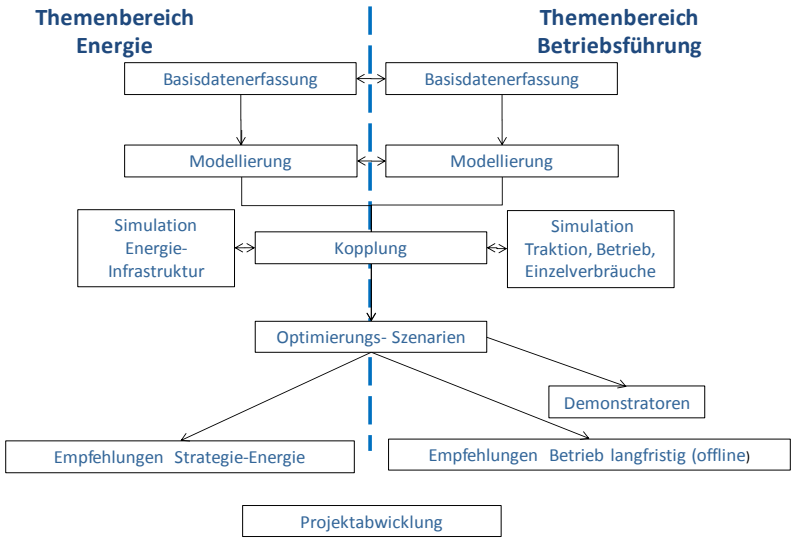
EcoRailNet

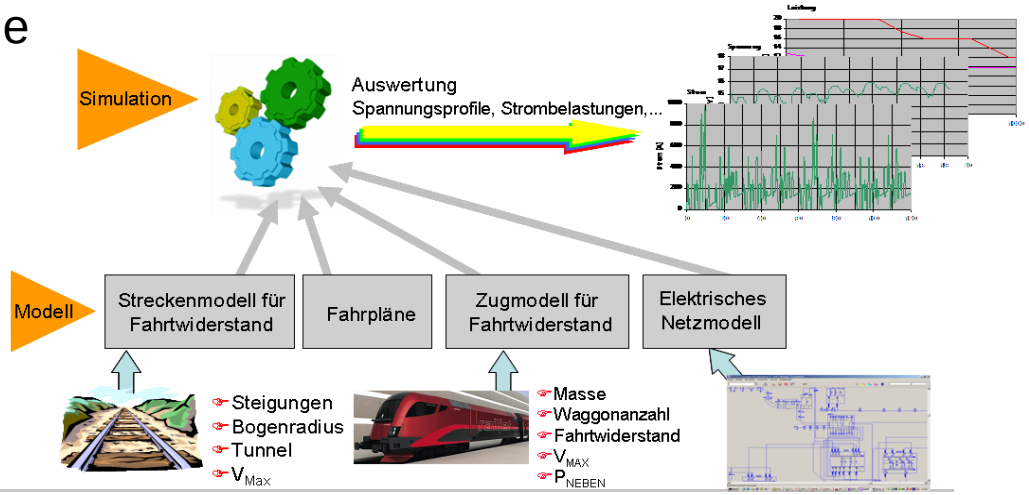
Link of railway service and railway power supply system

- Linking of the two previous separated fields in simulations
- Combined optimisation allows energy saving driving with adaption of the time table, also by short term errors
- Special assisting systems sending optimal driving suggestions to the engine driver.

Result:

- Verification of the prototype on a test track

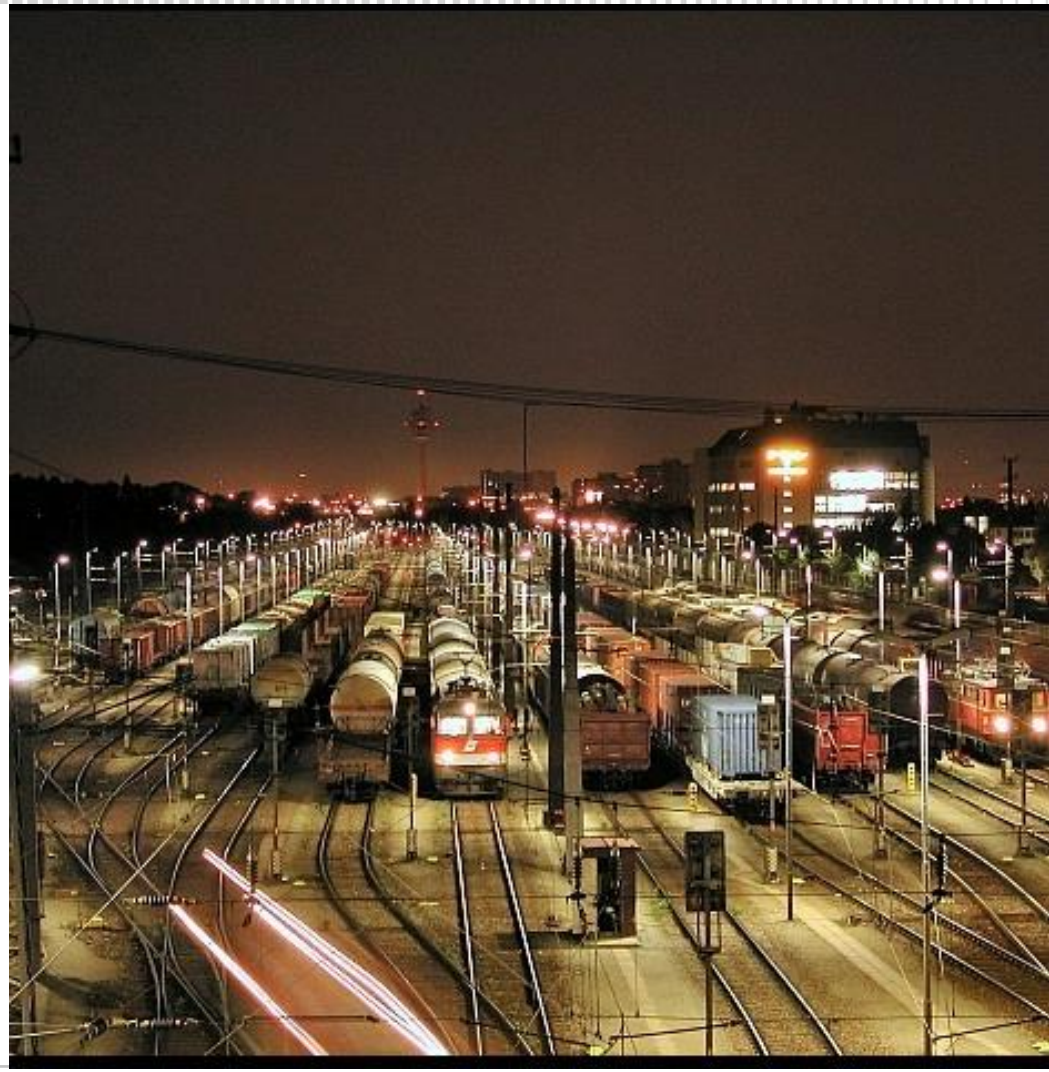




SIM – Shunt II

Capacity analysis of a shunting yard through simulation

- Improvement of the exploitation of existing shunting infrastructure
- Simulation with few, easy to determine input parameters
- Modular construction (configuration, Data generator, simulation, report generator)
- Short editing time
- Can be used for existing and future shunting yard



Pantho - Inspect

Current collector control =

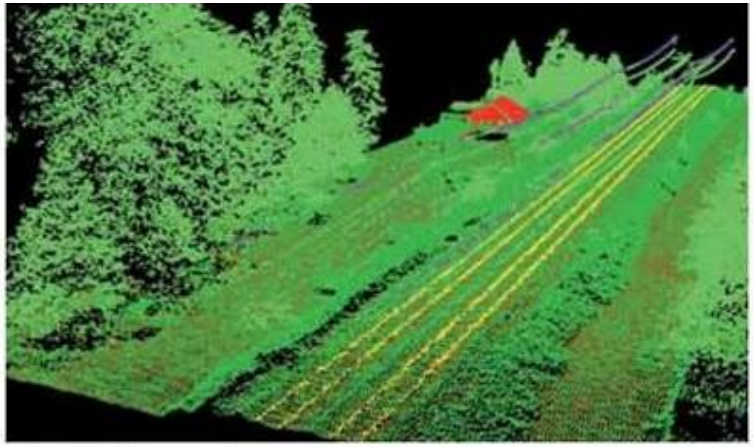
Minimising overhead contact line defect

- Additional research facility with train-running check point in Himberg
- With Laser cameras and near infrared light cameras the Panthograph head with its contact strips is automatically recorded and analysed.
- In critical cased the engine driver needs to be retained to change the pantograph, in the following the engine should come into maintenance.

Laserscanning

»Airborne Laser scanning and aerial picture data as basis for object recognition of railway infrastructure facilities «

Innovative methods were developed, which enables an automatic collection of informations about the railway infrastructure.



Classified track points within the point cloud

To handle the tasks of planning and management of the track network more precisely and time efficiently in the future, newly available technologies are tested and transferred into practicable systems.

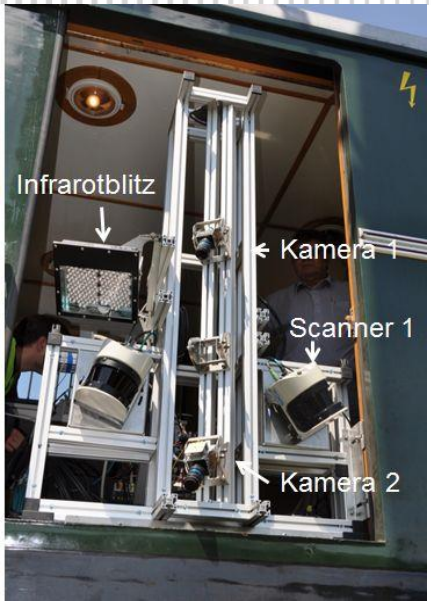
Sens-KM

Building a homogeneous basis for the positioning of railway infrastructure with simultaneously assignment of track´s km values.

- Geodetic track measurement based on markers on the poles.
- Track elements are available in high-precision, but only in relative coordinates
- wanted: transfer to absolute coordinates. But: not possible with traditional methods because of time and economic reasons.

Result:

Mobile measuring device, which measures and evaluates by contact free methods the markers of the track and hectometer-signs while passing.



From the past to the future …

Thank you for your invitation

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