07 / 2012

monitoring

advising

problem solving

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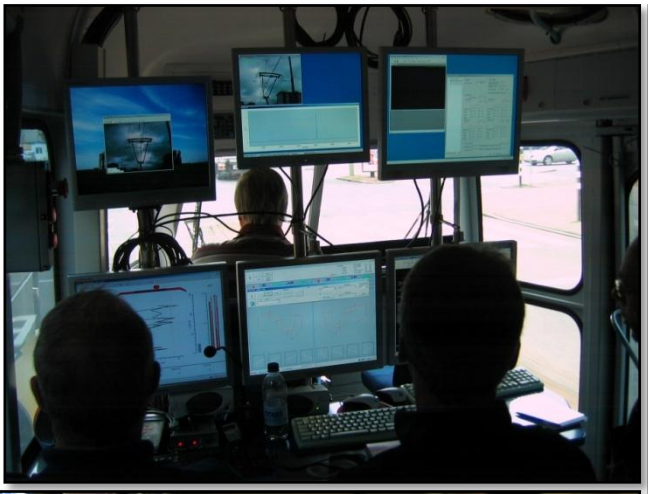
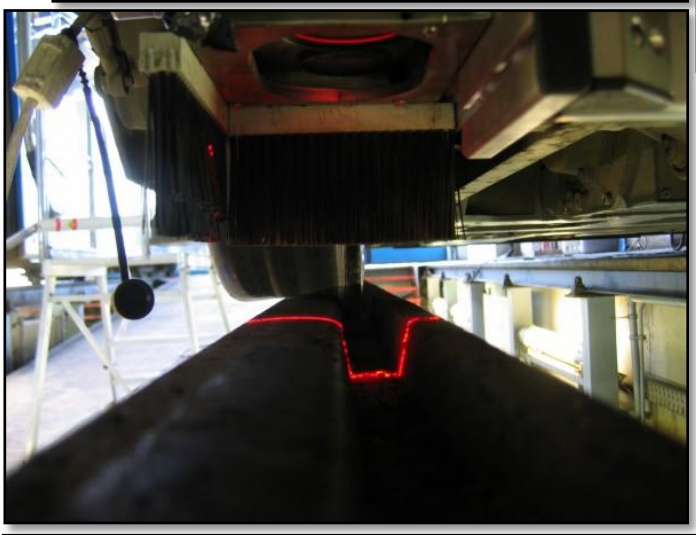
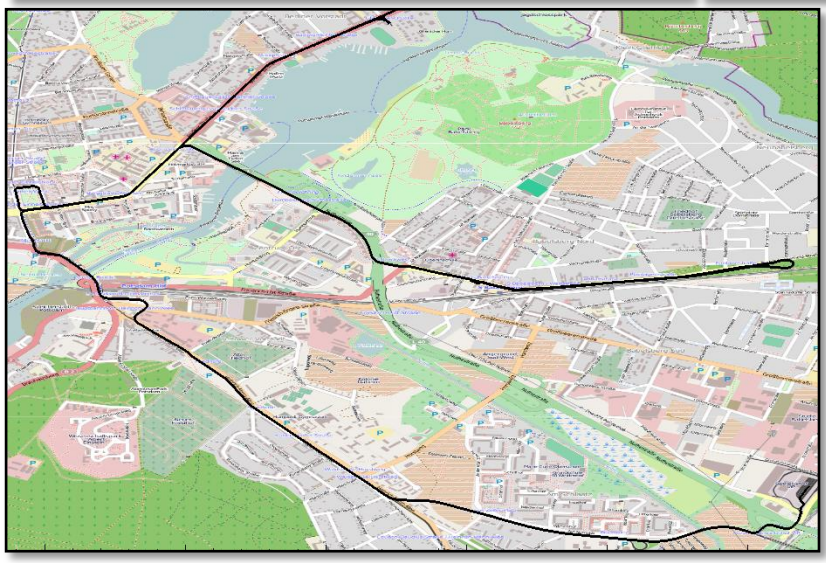
MEASUREMENT SERVICES







DTK exhibits at the InnoTrans 2012 · hall N°9c • stand N°143

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DTK measuring equipment

Introduction:

Systems developed by DTK to measure…

tracks:

- Gauge
- Shocks in three different directions
- Wear of the left and right rail
- Groove depth
- Groove width
- Direction of driving (course angle)
- Over height ramps
- Superelevation and cross level
- Torsion of the tracks
- Interaction between wheel and rail
- Position (via GPS)

vehicles:

- Hunting oscillation
- Passenger ride comfort
- Running clearance (e.g. space between vehicle and platforms)
- Flats on wheels (under development)

third rails:

- Exact position of the current shoe on the rail
- Pressure and shocks between the current shoe and rail
- Ramps
- Running smoothness
- Height
- Current and its direction
- Direction of driving (Course angle)

overhead lines:

- Stagger
- Exact position of overhead line(s) on the pantograph
- Shocks between overhead line(s) and pantograph
- Running smoothness of the pantograph on the overhead line
- Height of the overhead line
- Current and its direction

We always record the position along the route (via radar), and the actual speed for all our measurements. Waymarks may be set (with voice recording) during the measuring.

All of these systems can be used together and with a customers (passenger) vehicle at a normal driving speed.

wear of overhead lines:

DTK also has a system to measure the thickness (wear) of the overhead line. This system must be mounted on a hi-rail vehicle.

temperature of overhead lines:

- measuring of temperature on the overhead line and pantograph

special solutions for individual problems

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History

- 1990 Establishment as Company (GbR)
  development, production of pollution free, innovative contact strip for pantographs
- 1993 Establishment of the GmbH
- 1996 Completion of the first measuring system “Shock“
- 1997 Supplement, additional measuring of “Stagger”
- 1997 Increasingly active as service provider for public transport enterprises, main field of activity: measurements on pantograph- and overhead line systems (position, shocks, driving dynamics etc.)
- 1997 Establishment as individual problem solver for public transport enterprises development of: grease scraping-off device, railway catenary smoothing system...
- 1999 First measurement with the additional developed system “contact wire thickness“
- 2001 Headquarters in Zeuthen (Brandenburg)
- 2002 New system “wheel-rail“ to measure interactions between wheel and rail
- 2003 New system “third rail” to measure third rail characteristics
- 2004 New system to measure flats on wheels
- 2005 New system for measuring the track geometry and wear
- 2005 New system for testing of pantograph characteristics
- 2006 First time use of a gyroscope system for measuring the track, the position and the ride comfort
- 2007 New system to measure the running clearance of a route
- 2008 New system “platform measurement”
- 2008 development of the “explorer” software
- 2009 New system to measure trolley bus overhead lines
- 2009 New system infrared thermal imaging measurement
- 2010 New system to measure contact quality during the current transmission

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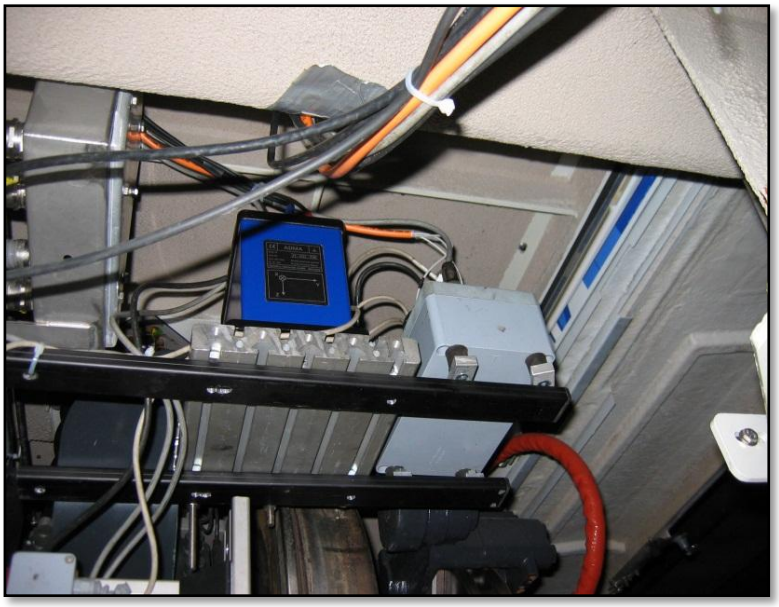
Speed, distance and position

- The speed of the vehicle will be measured with a radar sensor

- The path is calculated from the data for speed and time.
- The time and position are recorded synchronously. Thus an exact location of each measured value is possible.

- Manually recorded salient waymarks, like stations, road crossings, switches etc. provide additional information about the location of a measured value.

The gyroscope system and differential GPS are used to record the driving direction and position of the vehicle.



- The gyroscope is mounted under a vehicle and used to measure the driving direction and accelerations (shocks) in three dimensions.

- GPS antenna to determine the exact position

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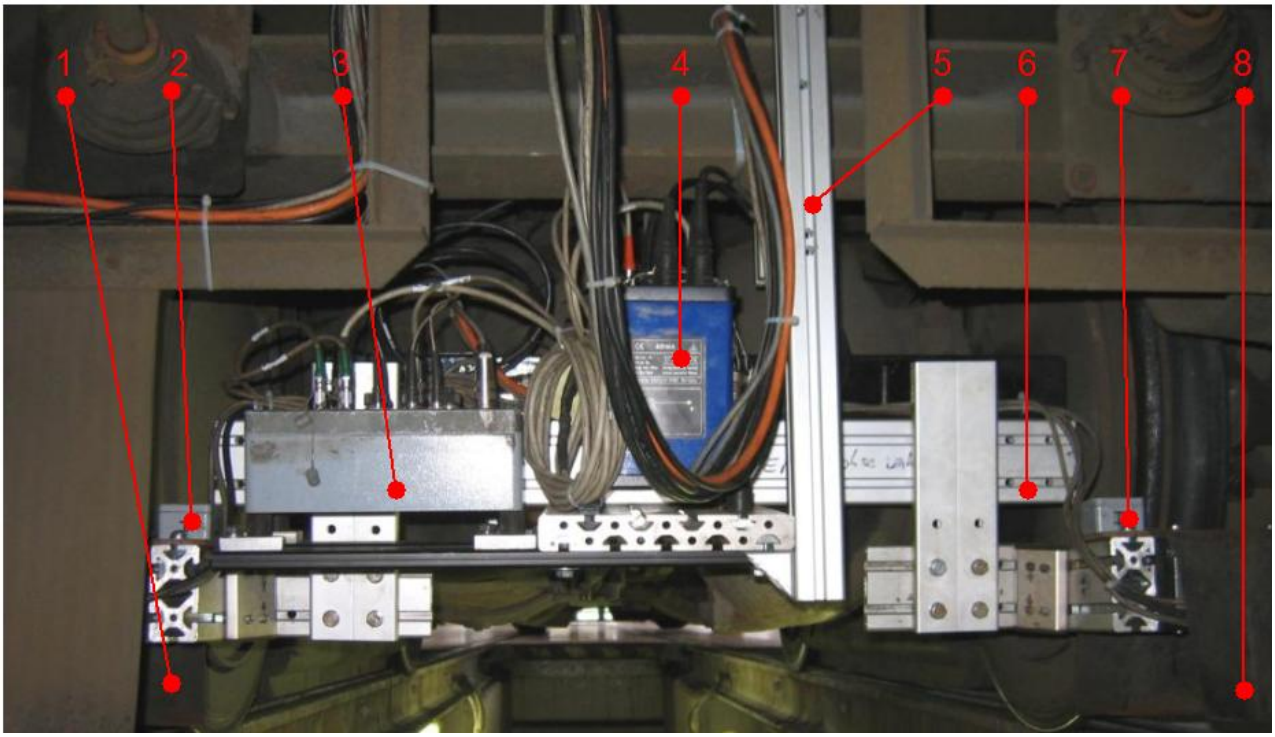
DTK measurement system track



Installation of track measuring system under a customer vehicle

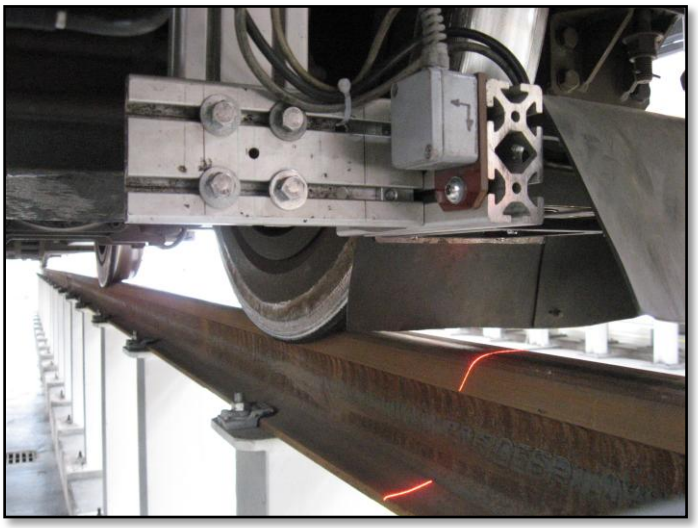
1	laser unit left	2	shock sensor left
3	controller	4	gyroscope
5	additional fixation	6	mounting
7	shock sensor right	8	laser unit right

The system can be mounted under a regular (passenger) vehicle.

The measurement can be accomplished under regular vehicle load running conditions.

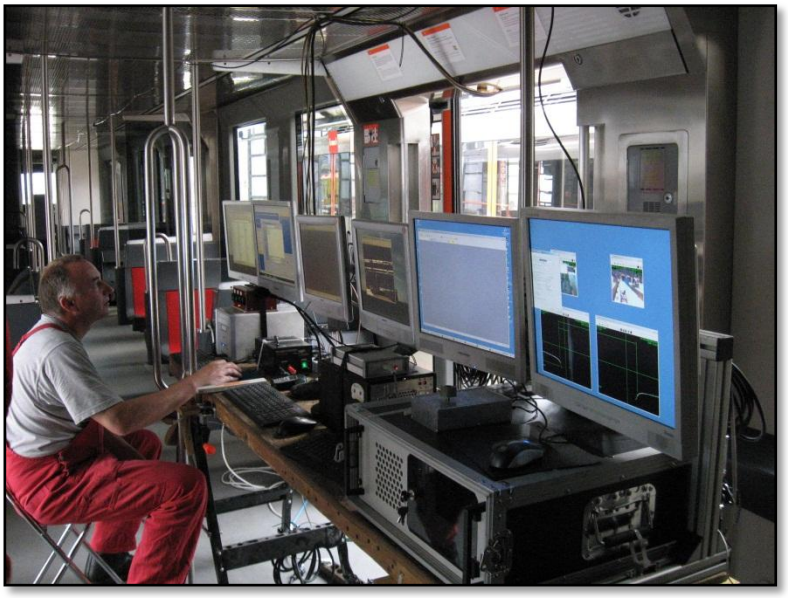
A laser system is mounted above each rail.

Via software the laser will be analysed.



The following parameter can be measured:

The gauge, the with and depth of each rail, the track super elevation, the geometry of the track, the wear of each rail (rail profile and flank angle) the curve radius (direction of driving), the torsion, the smooth run of the wheels on the rails, shocks between wheel and rail, and the position as GPS coordinates as well as over height ramps

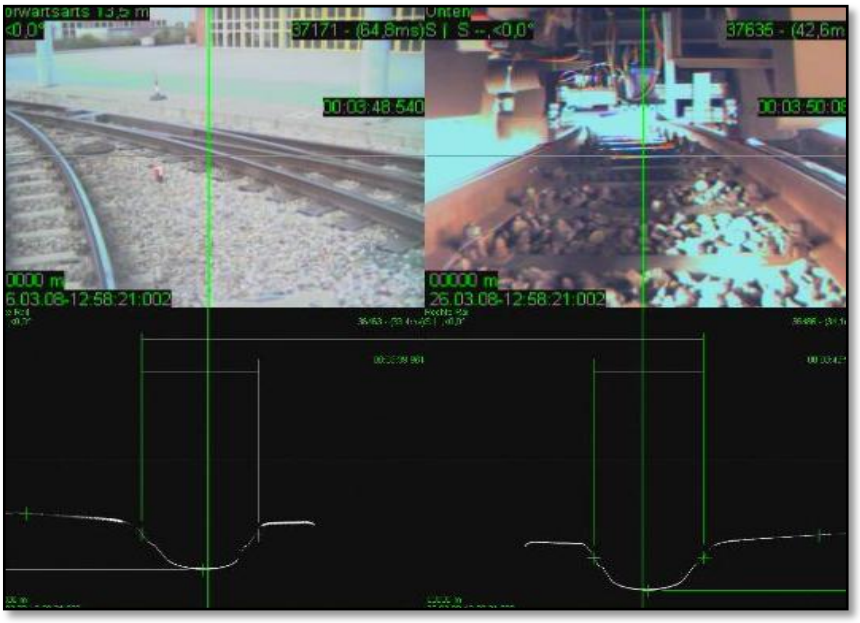


The different parameters are displayed on up to six monitors.

As for all other DTK monitoring systems the time, speed and way marks are recorded.

The measuring data and 4 videos are recorded synchronously.

First analysis can be made during the monitoring run.



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DTK running clearance measurement

DTK uses a self-made trolley which can be adapted to all kinds of track gauges.

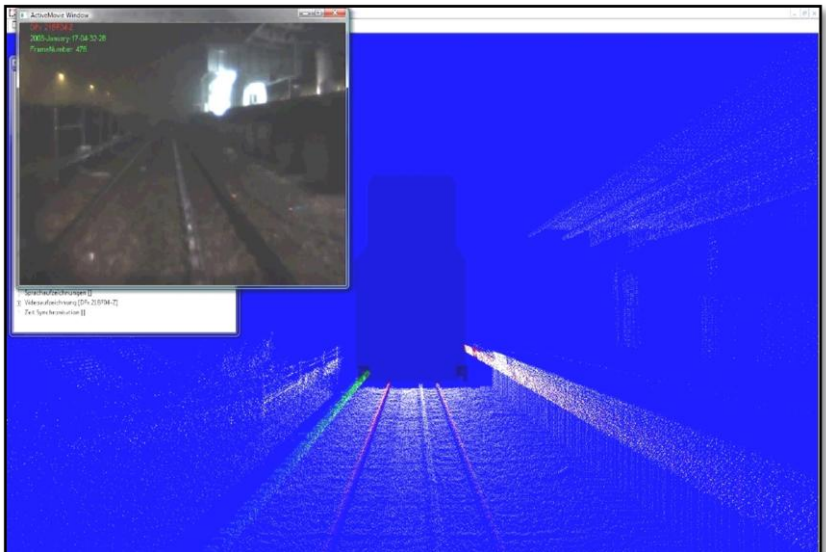
This measurement can be performed at speeds up to 40 km/h (25 mph).

The system records the surroundings along the route in a distance of 8 meter around the centre of the track.

It is possible to programme and evaluate several clearance profiles in a single measuring file.

Any encroachment of the clearance profile will be marked in red in the representation of the route.

The software displays the corresponding video sequences.



DTK trolley can be used for additional measurements, e.g. of the smooth running on the tracks or the wear of the rails.

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DTK platform measurement

DTK system for platform measurement makes it possible to check the specified dimensions of handicapped-accessible platforms, in particular:

The distance between the platform edge and the track (either left-hand or right-hand, depending on which side of the train the platform is located)

The height of the platform edge in relation to the track.

So far employees of public transport companies had to carry out random checks manually with a ruler, e.g. every 5 meters.

DTK system instead measures these values in a comfortable contactless way every 5 cm (20 data set per meter).

To perform this measurement, DTK installs two laser/camera units on a sliding carriage, whose lateral guiding device is fixed to the vehicle’s front bumper.

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DTK measurement system polygons and wheel flats

The system is fitted onto the rails and measures wheel flats and polygons by “listening” to the wheels as they pass over the sensor.

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DTK measurement system flat spring

The DTK flat spring system is a special economic solution of clearance monitoring. The clearance will be measured only in the spring-mounted area. If now the clearance in this area will be disturbed the springs move and a potentiometer sizes the interrupts.

The system is used to:

- detect the reasons for wheel chant cuts
- find places where brakes hit the ground

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DTK measurement system passenger comfort according to UIC 513

Three sensors installed in the first and last row of seats as well as in the middle of the train record the vibrations to which the passengers are exposed.

Software calculates comfort indices according to UIC 513 to determine if the vehicle offers a sufficient comfort level.

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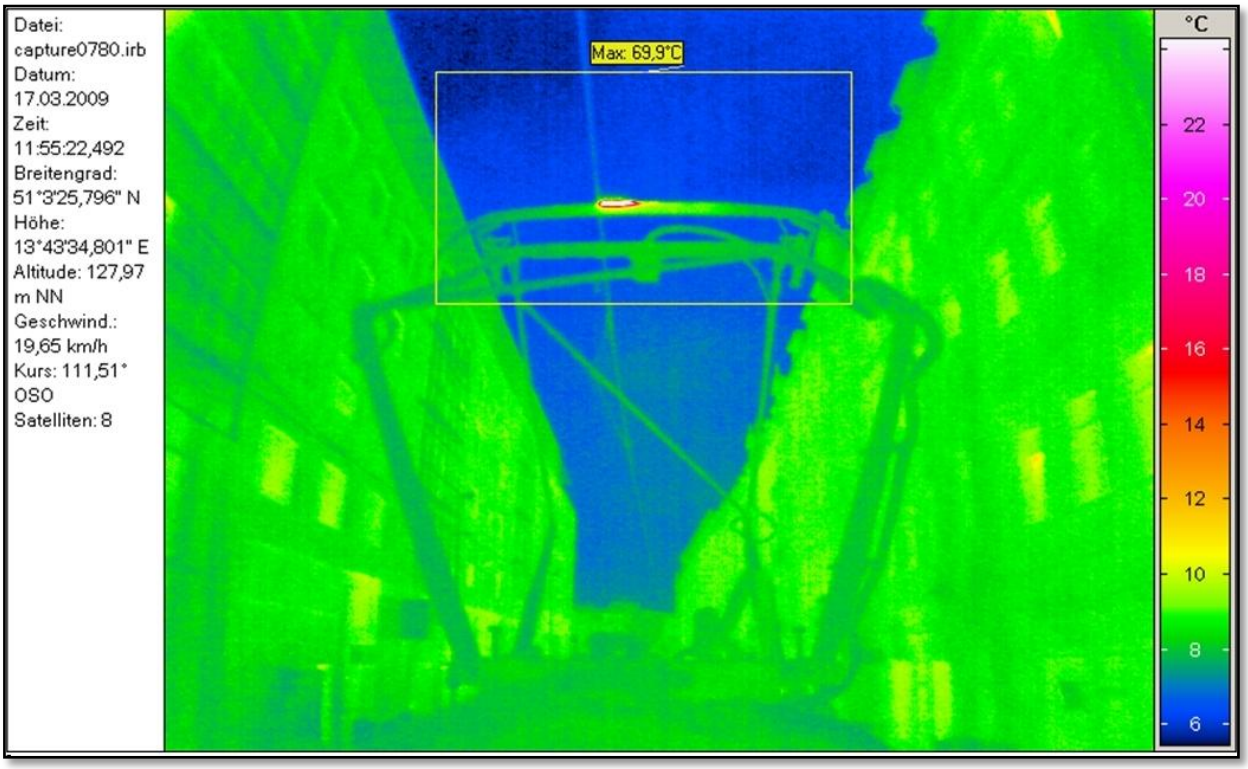
DTK measurement system thermal imaging



DTK infrared thermal imaging system makes it possible to check the temperature at the contact point between overhead wire and contact strips.

- 60 measurements per second
- Accuracy: 0.1 °K

- This system is useful in all cases where energy can be transformed into heat as a result of an insufficient electric contact, e.g.:

  - energy recovery systems
  - control boxes
  - 3rd rail connections etc.
  - to control brake pads

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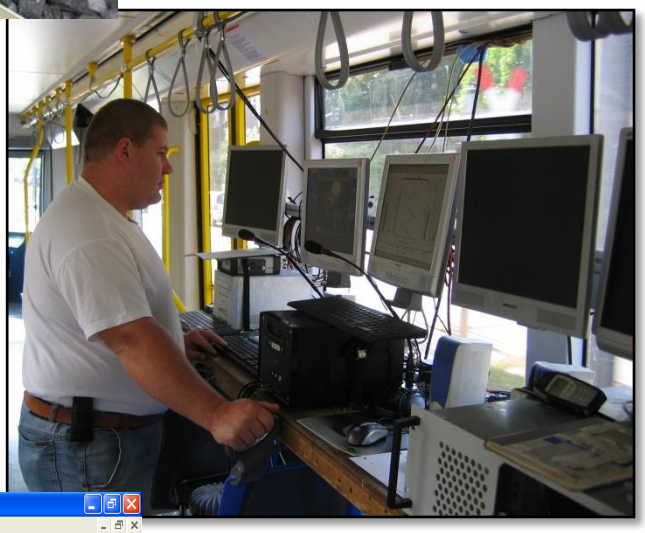
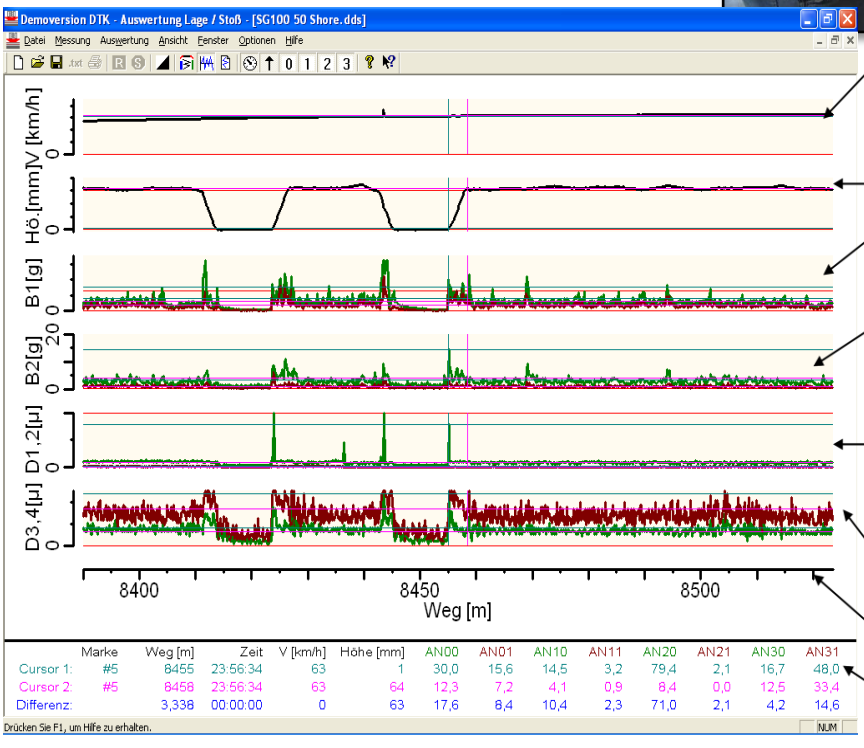
DTK measurement system third rail

- Measurement of acceleration, movement and pressure of the current collector on the rail, etc.
- Determination of the effects when the current shoe impacts on the third rail ramp
- Measurements of the conducting parts

- Image shows the system during the measurement in the vehicle
- Using extensive evaluating software for analyses etc.





Speed during the test travel

Height of the current rail

Acceleration at the current shoe in x- and z-direction

Acceleration of the current shoe holder in x- and z-direction

1. and 2. stretch measurement points on the current collector

3. and 4. stretch measurement points on the current collector

Route distance

Data values at the cursor positions

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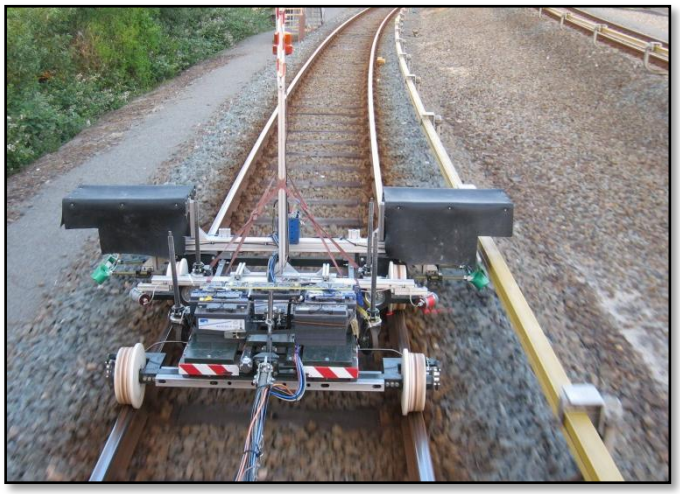
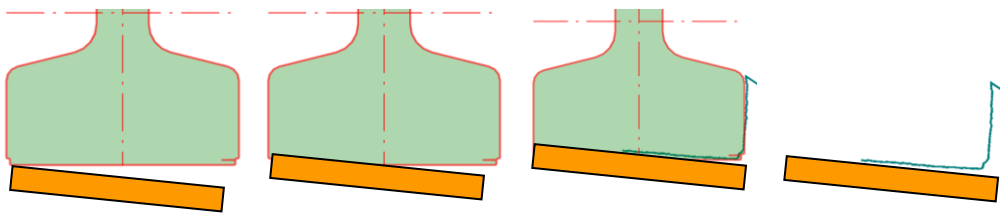
DTK measurement system third rail wear

* Contour of the conductor rail is recorded by a laser unit.
* Hence wear and the actual contact area with the current collector can be determined.



- Thus changes in position or other problematic sections are recognized.
- Even slight lateral height changes of the current collector arm’s pivot point may have a large impact on wear.



This current rail is mounted too high, which initially results in a one-sided wear of the outer edge of the rail. Gradually an inclined wear along the whole contact area of the current rail is recordable.

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DTK pantograph monitoring

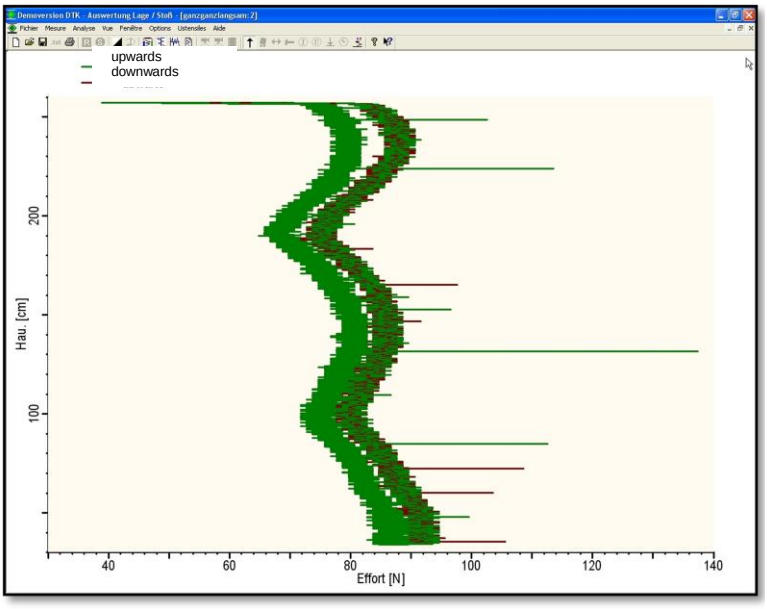
DTK system for pantograph monitoring allows for the check-up of the pantograph's kinematics and dynamics as well as of its interaction with the overhead line.

DTK measures the pantograph's contact force up- and downwards over its complete operating range, which is divided in 10 cm (3.94 in) high steps.

This measurement will be repeated at different speeds between 2 and 30 cm/s (0.8-12.8 in/s).

The same procedure, carried out at a very slow up and down motion (0.3 cm/s; 0.12in/s), delivers the so called pantograph response curve.

This curve provides useful information about the pantograph's optimal working position and contact wire's height. It also helps to determine whether it is necessary to readjust the pre-set contact force at the customer's depot.



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DTK measurement system position-shock (stagger)

The measuring equipment can be fitted onto the pantograph of a revenue service vehicle.

The data will be transmitted into the vehicle via fibre optic cables.

Inside the vehicle data and videos will be recorded, displayed and saved on hard disk.

Via a manual key press additional way marks can be entered during the running measurement.

Way marks can be named via a microphone.

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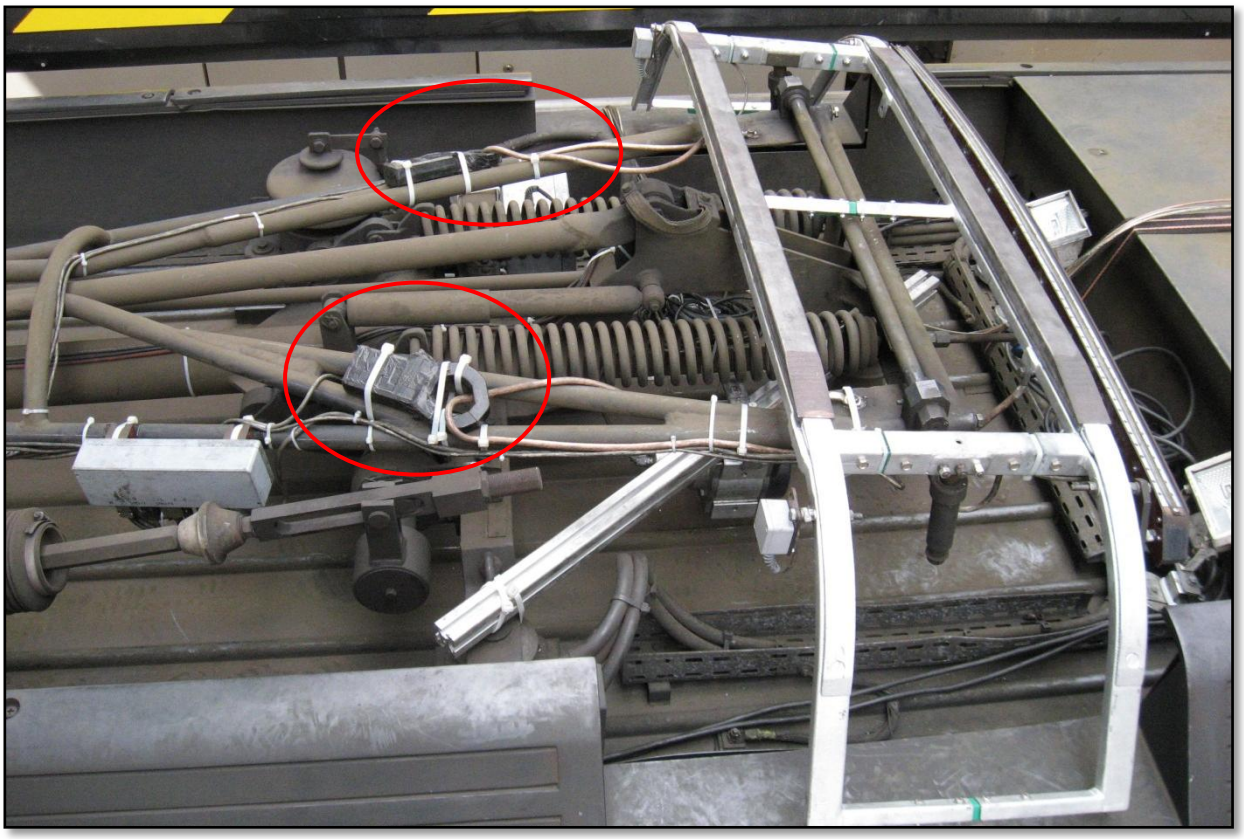
DTK measurement system current-voltage

Current and voltage can be measured at the same time as position-shock (stagger).

The current being drawn and returned (if an energetic recovery system is available) will be determined for each contact strip.

The catenary voltage can be measured (in place of the shock measurement).



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DTK measurement system overhead line thickness (wear)

The System can be fitted to a hi-rail vehicle or to a revenue service vehicle.

The thickness of the overhead line is measured to an accuracy of 0.1 mm.

The wear can be calculated.
Problematic sections are identified.

The remaining service life of the overhead line can be estimated.

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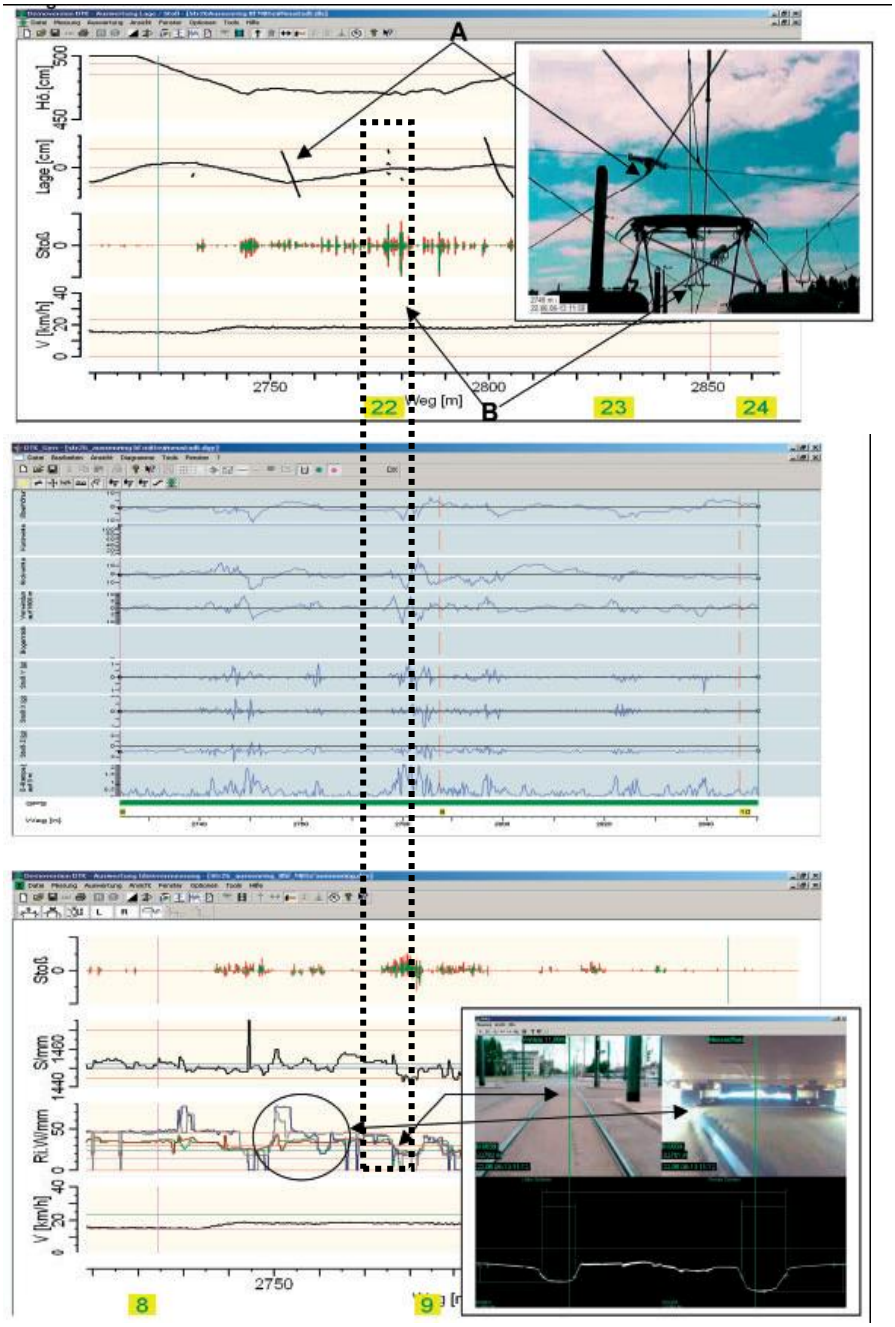
Synchronization of DTK systems

•If two or more systems are installed in example the track-monitoring system and the overhead line system, data for exactly the same position can be analysed for the overhead line and the track.

•This saves time and money, since only one measuring run is necessary to get all needed data

•It also allows for the identification of problems which are caused by the interaction between tracks, vehicle and overhead line

•The software shows close connections between rail and overhead line problems



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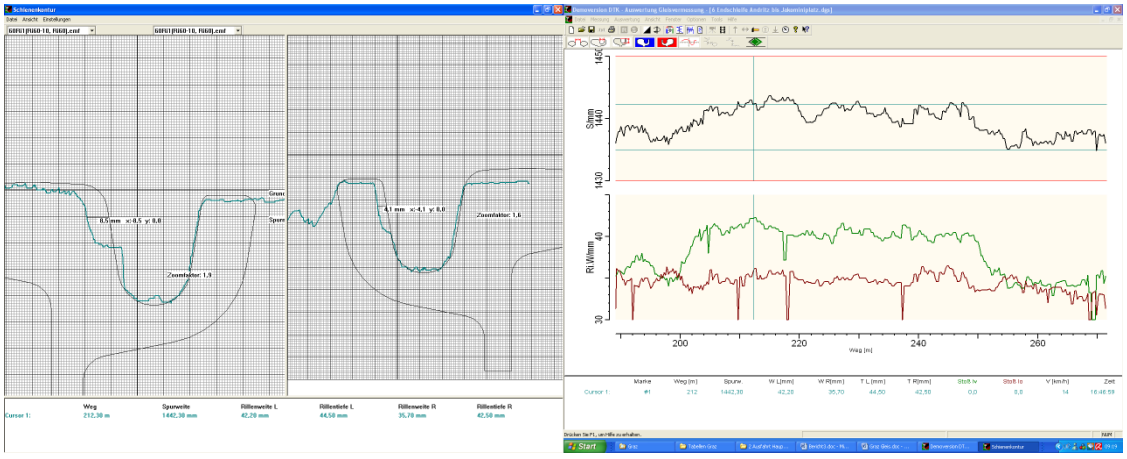
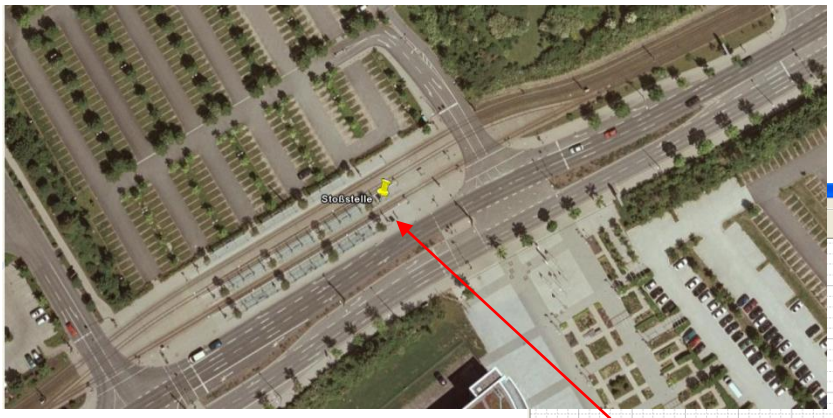
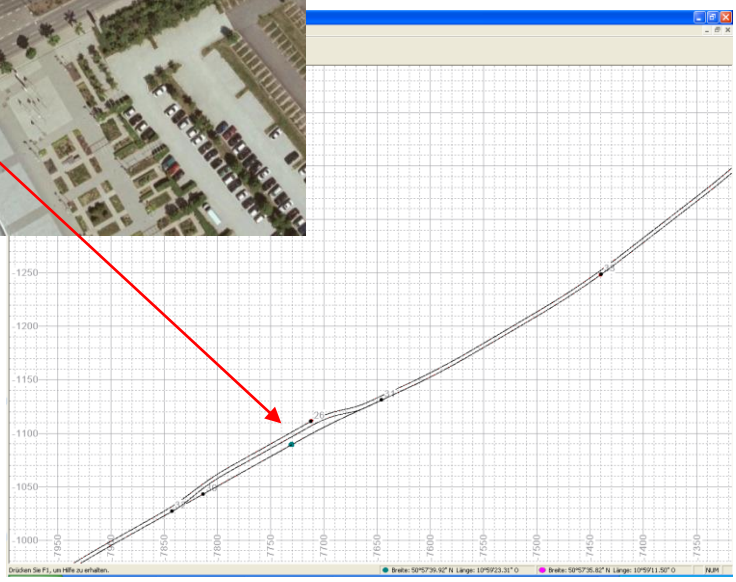
DTK rail profile software and route overlay on maps

•The rail profile software shows the rail profile condition at any point on the measured route and allows an exact analysis of the rail wear.







- At same time a gyroscope and DGPS determine the track position and coordinates

- route coordinates can be assigned to digitised maps

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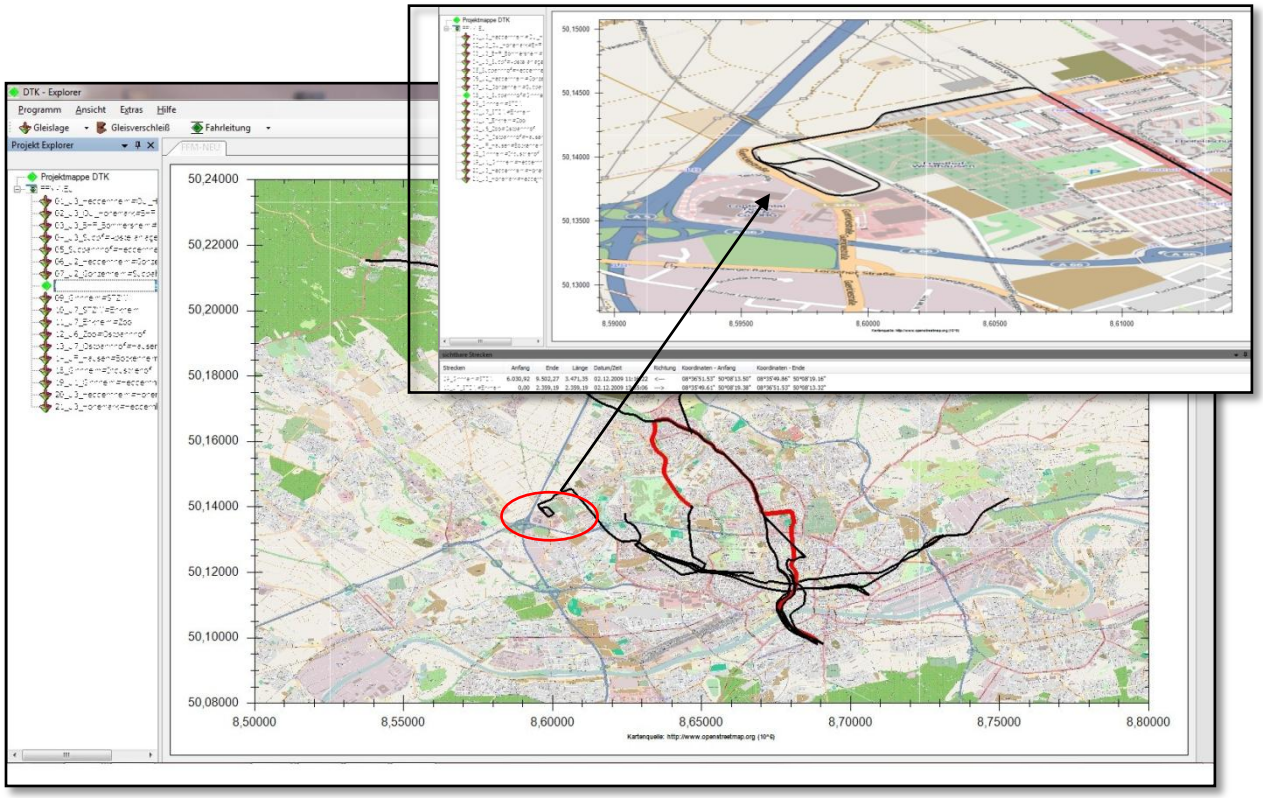
DTK explorer



The DTK explorer was developed:

- for easy comparing of measurements routes
- for route digitalisation on maps and a better orientation
- for listing of all measured routes (the corresponding route section will be highlighted in red on the map after selecting a file in the list)
- to show the number, the direction of driving, and the date of measured routes

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Results after the examinations

Immediately after each examination clients receive:

- Measurement data, video and audio files
- The DTK software as DVD
- Instruction in the use of the analysis software
- Approx. 4 weeks after measurement client will get an investigation report

DTK can provide additional software training if required

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Some examples of specific solutions to our customer's problems:

- We found the causes why wheel shunts on the tram wheels were cut (Frankfurt/Oder - Germany)
- We developed a system to scrape grease off the wheel flange (Berlin Underground - Germany)
- We supplied contact strips to scrape off ice of the overhead line (Würzburg - Germany)
- We made comparative measurements of various vehicles and pantographs (Berlin - Germany, Basel - Switzerland and other rail systems)
- We found the cause of vertical vibrations of vehicles (Brandenburg/Havel - Germany, for Rhätische Bahn – Austria and Melbourne – Australia).

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Publications of DTK GmbH

Der Nahverkehr 2011 issue 7+8	Assessing the position of the wheels contact point to the rail and the hunting oscillation during service operation
Verkehr und Technik 2011 issue 5-6	capturing of the clearance profile and
Der Nahverkehr 2011 issue 1-2	determining the actual clearance between operating railway vehicles and their surroundings
Verkehr und Technik 2010 issue 10-11	The Influence of the rail conditions on ride comfort
Eb Elektrische Bahnen 2010 Heft 10	Determination of the transition resistance fom the overhead line to the collector strip
Eb Elektrische Bahnen 2010 Heft 8-9	Inspection and improvement of third rail current collector systems
Verkehr und Technik 2010 issue 3	Wear measurement on trolley bus catenaries
Verkehr und Technik 2009 issue 12	Measurements on current rail plants
Verkehr und Technik 2009 issue 11	Contact quality valuations of overhead line or current rail and contact strip by help of thermal imaging investigations
Der Nahverkehr issue 10/2009	Bilbao has proven new measurement-systems for overhead line and wheel/rail
Verkehr und Technik 2009 issue 10	Tests for the smooth run of wheels on rails
Verkehr und Technik 2009 issue 6	Concept for a system to measure the wear of trolley bus overhead lines
Verkehr und Technik 2009 Issue 4 and 5	Analyses for contact quality advantage between contact strips and overhead line
Eb Elektrische Bahnen 2009 Heft 3	Contact advance between overhead line and contact strips

Verkehr und Technik 2008 Issue 1	System analysis – current drawn of the overhead line Influences of the track, of the vehicle and of the pantograph onto the catenary system
eb Elektrische Bahnen 2007 Issue 12	Current and voltage measurement on the overhead line of the city Brussels
The rail engineer 2007 issue 31	Accurately Measuring
Verkehr und Technik 2007 Issue 5	Measuring track while traction mode under load for site evaluation
Verkehr und Technik 2007 Issue 3	New concept to optimize wheel- rail profile
Verkehr und Technik 2006 Issue 9	Measuring the track and overhead line with a normal (passenger) vehicle
Verkehr und Technik 2006 Issue 4	Measuring system for track wear
eb Elektrische Bahnen 2005 Issue 7	Tests of overhead line and current collectors
Verkehr und Technik 2005 Issue 5	Overhead line and current collector test system
Verkehr und Technik 2004 Issue 9	Detecting of flat points on wheels during the passage of a train
Verkehr und Technik 2004 Issue 5	Measuring system to test a metro current rail system and a third rail current collector
Verkehr und Technik 2003 Issue 6	Causes for the wear of the overhead line
Vezetékek Világa 2002/3	Új felsövezeték-mérési
(Hungarian Rail Technology Journal)	technológia (new overhead wire measurement technology)
Verkehr und Technik 2001 Issue 8	Measuring the overhead line thickness as Service of DTK- GmbH
Verkehr und Technik 2000 Issue 8+9	Some results of overhead line measurements

Verkehr und Technik 1999 Issue 5	New system for testing overhead lines and current collectors
Verkehr und Technik 1998 Issue 10	DTK concept of measuring the thickness of the overhead wire
Verkehr und Technik 1998 Issue 5	New current collector for difficult driving conditions

and more…

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Do you have a problem which needs to be solved?

- If you have any problem please ask us, our standard solution may be of use
- Also, if needed, we can adapt or design a special system to meet your requirements
- We would be very pleased to be of assistance

Please do not hesitate to contact us.

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