SWITCH INSPECTION OPTION

The trolley must be provided with two special rollers for the turnout option. The rollers can be raised to the transport position and very easily re-set to the measuring position.

The rollers measure:

- width of open tongues
- groove of the guard rail
- groove of the wing rail and frog
- back gauge
- channel width

Measuring software

An additional feature of the KrabDroid measuring software supports data collection at discrete switch locations as special events. Each such event contains the name of the station, switch number, measured values and visual inspection values.

Analysis software SWITCH™

This advanced software tool automatically couples the main and turnout branches of the switches, analyses the events and builds a Switch Inspection Report.

KZV s.r.o.
Commercial railway research

Manufacturer:
Komercni zeleznicni vyzkum, spol. s r.o.
U Kaplicky 1199, PRAGUE 6, CZ-165 00
tel./fax.: +420 233 920 185
cell.: +420 604 830 199
e-mail: jturek@kzv.cz, web: www.kzv.cz

Measuring trolley

KRAB NCI

for track geometry and rail profiles

The Krab NCI is the newest product of our Krab family. It was designed with a focus on low weight and easy operation using non-contact technology.

This concept enables the measurement of track geometry as well as rail profiles. The principle of measuring with the chord is kept and enhanced by coordination with the inertial sensors.

The Krab NCI fulfills all the requirements of the EN13848-1 and EN13848-4 standards.

The Krab NCI can be made for any nominal track gauge (e.g.760, 1067, 1435, 1676 mm) and it can be used for all common vignoles and grooved rail profiles including UIC60.

KZV s.r.o.
Commercial railway research

MEASURING PRINCIPLE

Non-contact measuring technology is achieved using 3D cameras. The main advantage of the non-contact concept is the measuring of track geometry and profiles of both rails using one device. Wear and tear of the rails is determined by reading the track rail profiles (vertical, horizontal, by user-defined angle, etc.).

The Krab NCI can be easily enhanced by the use of rollers for measuring groove width gauge that extends the scope of application of this device to measure and inspect switches.

During the measuring run the following so-called primary track values are scanned in intervals of 0,25 m:

- **gauge** (potentiometer transducer on the left wheel)
- **alignment** (lateral versine) of the right rail
- **top** (vertical versine) of the right rail
- **cant** (new, highly reliable and precise inclinometer)
- **quasi-twist** on the twist base 0,9 m (option; it increases the precision of the final cant measurement)
- **track gradient** (option)
- **track distance** (odometer-optical encoder)
- **measuring speed**

TROLLEY DESIGN

The Krab NCI is light and is easy to maneuver. It weighs 31 kg and data accuracy is guaranteed up to the speed 15 km/h. Two people are required to handle the trolley, but only one person is able to move it away from the track in an emergency situation.

The use of non-contact measuring technology makes the passage through the switches easier and simplifies the arresting system that is required to pass through the frog (brakes, blocking).

For transportation the trolley can be easily folded in 2 minutes:

ON BOARD COMPUTER

The real time processing of signals from the 3D cameras is performed by a rugged measuring computer (Android based system) with the KrabDroid measuring software. The on-board computer has enough memory for at least 2000 km with a battery life of 8 hours without charging.

The following items are reported using the KrabDroid software:

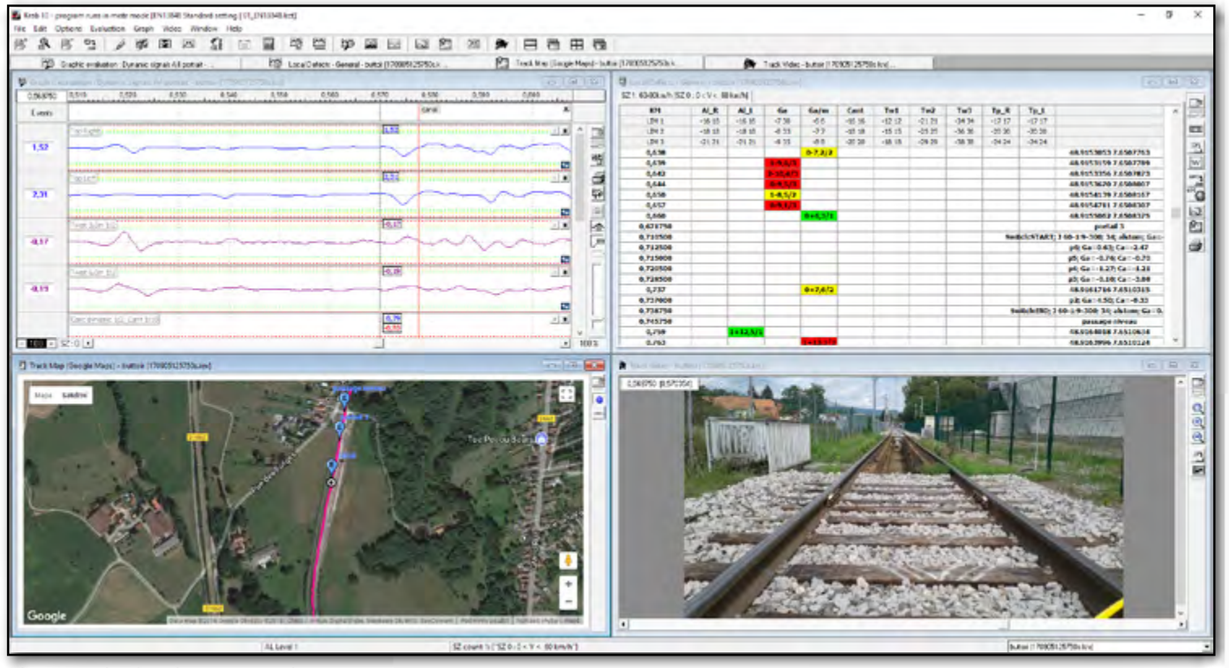
- reading and scanning of the above signals
- on-line processing of the signals:
  - graphical presentation of the signals
  - optical signaling when the geometry data exceed the selectable thresholds
- display of numerical values of the geometry data
- display of the rail profile graphs with indication of:
  - lateral wear value
  - plastic flow value
- recording of the data into non-erasable storage of the on-board computer at selectable sampling steps (2,5 cm - 25 cm)
- recording of the information describing the track section to be measured
- recording of events (point events, e.g. mud spots in ballast or section events, e.g. bridge, level crossing) with the exact positions along the route

THE ACCURACY OF THE REPORTED GEOMETRY VALUES, SEE TAB.:

Geometric quantity to be measured	Resolution	Accuracy [2] [mm]	Range [mm]
Gauge	0,1 mm	± 0,4 [1]	-15+50
Gauge variation per 1 m	0,1 mm	± 0,5	-
Vertical alignment - Top (waveband 1÷25 m)	0,1 mm	± 0,7	± 100
Horizontal alignment (waveband 1÷25 m)	0,1 mm	± 1,0	± 100
Cant (the absolute value)	0,1 mm	± 1,0	± 250
Cant (the relative value for twist calculation)	0,1 mm	± 0,7	-
Twist (any twist base)	0,1 mm	± 0,7/ℓ	± 15 ‰
Rail profiles	0,1 mm	± 0,2	120x200
Speed	0,1 km/h	0,3 km/h	<15 km/h
Track distance	1,0 mm	1 ‰	No limits

[1] excluding temperature effect
[2] in terms of reproducibility 95%

Measuring software KrabDroid



The example of evaluation in Krab 10

EVALUATION OF THE COLLECTED DATA USING THE KRAB 10 SOFTWARE

After measuring, the collected raw geometry data are transferred from the measuring computer into any PC computer. Sophisticated assessment software computes the, so-called, actual geometry (with the unit transfer function) via the FFT (Fast Fourier Transformation) technique. Therefore, the following items are available:

- actual alignment and level in a selectable waveband
- separation of all geometric signals into long wave and short-wave segments
- TQI (Track Quality Index) evaluation - statistic evaluation of the track geometry based on standard deviation and quality index (the number of various TQI standards are available, e.g. DB, SNCF, IP, CRC)
- table of local defects, print out of geometrical lay and tables
- export of all data to excel and/or .csv files

THE BASIC TECHNICAL DATA:

Mass: 31 kg basic unit
2,5 kg auxiliary shielding against low sunshine
1,5 kg auxiliary turnout rollers

Autonomy: 6 hours without battery charge
Working temperature: -5 to +55 °C

The wheels of the Krab NCI are made of a combination plastic and hard steel material to avoid problems with the wheel counter sensors:

KRAB NCI