Determination of neutral temperature of rails

with **RailScan** device

*Non-destructive measurement process for determining neutral temperature of continuous welded rails*

**Measurement principle**

Operation of the RailScan device is based on the principle of magnetic Barkhausen-noise. The RailScan determines magnetic characteristics from the Barkhausen-noise acquired by the means of magnetising the rail surface to be measured both in the longitudinal and transversal direction.

The RailScan device consists of a hand trolley that can be pushed along the rail, the instrument unit and measuring probe mounted onto it. The instrument unit contains a foil keyboard computer controlled measuring electronics. Electric power of the device is supplied by an external battery.

The measuring probe consists of two clamps that can be pressed onto the fillet radius between the rail-web and head against a spring. The measuring head is designed in strict accordance with rail types. Temperature of the rail can be measured with a low thermal lag rail thermometer attached to the measuring probe.

**RailScan device**

**Measurement with the RailScan device**

The measuring program enables the measurement of 50 cross-sections in a measuring cycle. This way the length of the examined rail section can reach 100...300m, time of measurement is 20 minutes in average. Magnetic characteristic values calculated from the measuring results can be followed on the screen of the instrument unit during measurement. Values displayed so are proportionate to mechanical stress state and material characteristics of the given cross-section.

Measurement are to be performed at two different rail temperature value. The two different temperature values in a continuous welded rail track result in a calculable stress change.

Measurements are being carried out without hindering train traffic.

**Screen of the RailScan device during measurement**
Application of the RailScan device

in status survey of continuous welded rail tracks and in inspecting construction and maintenance works are application fields of the RailScan device quite wide. With the device long sections can be examined economically with adequate frequency and because its accuracy is appropriate it proved to be applicable in researches concerning neutral temperature of continuous welded rail tracks. Reliable knowledge of neutral temperature of continuous welded rail tracks is one of the important questions of operating railways safely. Neutral temperature will not stay at the value determined in the course of finalizing railway construction works, because of several reasons like creeping of the rail, track sinking, track radial moving and effects of track maintenance. Fluctuation of longitudinal forces of continuous welded rail tracks is due to incorrect rail neutral temperatures, improper tension (rail clipping) or specific track structures like bridges or because of turnouts. It is important to be able to evaluate the distribution of force and to control the highest rail force to decrease tendency of buckling and excessive tensile stresses.

The RailScan device provides proper solution for these tasks. Although its application requires preliminary calibration for the rail type to be examined, but hereafter neutral temperature can be determined by a non-destructive method and therefore it is economical. Look at the results of the past years!

Specification

Central computer: IBM PC compatible computer (386, SX 16MB)

Keyboard: Foil, IP 54,

Computer connectors: RS 232, floppy disc

Instrument connectors: MBN measuring probe, temperature sensor

Operating temperature: +5°C...+40°C (air temperature)

Operating time: min. 4 hours/battery

Time demand of measuring one cross-section at one temperature: ~ 20 seconds

Time demand of measuring one measuring section at a temperature value: ~ 20 minutes

Accuracy of neutral temperature determination if neutral temperature falls into the 0...35°C range and there was at least 7°C difference between temperature values of measurements: ±3°C

External battery pack: 1 pc 12V-3Ah, 1 pc 12V-7.2Ah

Weight: 12kg

Dimensions: 850 x 600 x 300mm

Accessories

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>RailScan.EXP measuring software</td>
<td>1 pc</td>
</tr>
<tr>
<td>RailScan.EXP evaluating and printing software</td>
<td>1 pc</td>
</tr>
<tr>
<td>Battery pack</td>
<td>2 pcs</td>
</tr>
<tr>
<td>Battery charger</td>
<td>2 pcs</td>
</tr>
<tr>
<td>Measuring probe for 1 rail type</td>
<td>1 pair</td>
</tr>
<tr>
<td>Carrying bag for accessories</td>
<td>1 pc</td>
</tr>
<tr>
<td>User manual</td>
<td>1 pc</td>
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<tr>
<td>Serial cable</td>
<td>1 pc</td>
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<tr>
<td>Test rail for 1 measuring probe</td>
<td>1 pc</td>
</tr>
<tr>
<td>Temperature sensor</td>
<td>1 pc</td>
</tr>
</tbody>
</table>

Option:

Transport box for the device and accessories
Measuring probe and test rail for other rail types
External floppy drive

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