



BP German freeway A14 near Plötzkau - Search for water ingress in range of seams of decks - moisture scan from 2009-03-31



On 2009-03-31 we carried out moisture scans on the German freeway A14 Halle – Magdeburg near Plötzkau. A potential water ingress has been determined on that occasion especially in the range of tile spacer.

The demand for such investigations derives from the assembling of miscellaneous parts of the motorway. Here, the interaction of inserted stones with used de-icing salts (in Winter times) together with moisture plays a major role for the entry and progress of alkali-silica-reaction. In particular the moisture exposure is one important parameter which could be measured the first time when carried out those moisture scans.

Within 6 hours 10 motorway parts with a total area of 1.000m² has been entirely scanned by using a spatial resolution of 15 cm. By using microwave scans there will be the one and only possibility of getting comprehensive figures of moisture exposure.



Measurements:

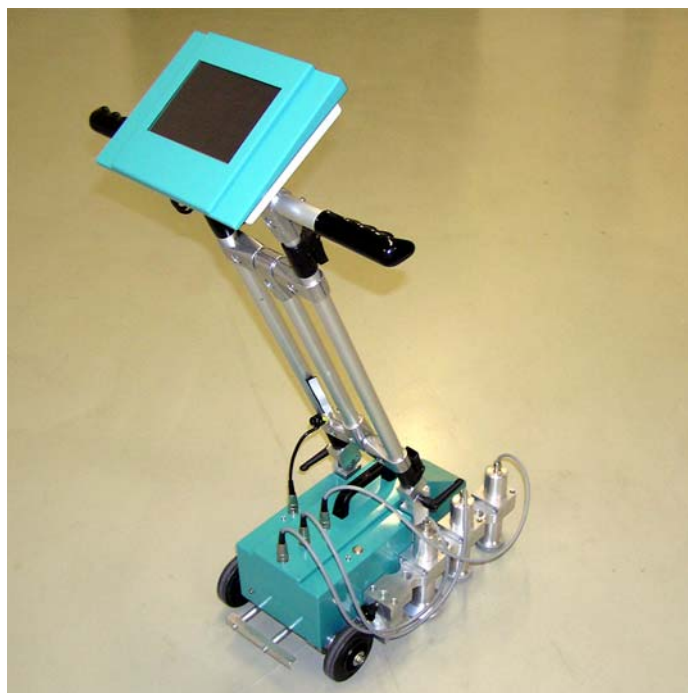
Upon parts of the motorway which had to be measured due to their moisture distribution surface- and volume moisture measurements has been carried out. The measurement was accomplished with the microwave based moisture scanner MOIST SCAN 100.

MOIST SCAN was developed for high resolution investigation of moisture distributions on large areas. Using MOIST SCAN it is possible to scan up to three depth layers in one track. MOIST SCAN was equipped with the microwave sensors

- MOIST R2S (for surface layer up to 4 cm penetration depth)
- MOIST DS (for mean layer up to 10 cm penetration depth)
- MOIST PS (for volume layer up to 20 - 25 cm penetration depth).

The moisture scan was recorded in measuring mode FI (moisture index). FI gives the moisture-dependent microwave reflectivity of the underground and delivers a dimension-less number between 0 and 4000. FI is a measure for a material under test being dry or wet. Low moisture index compared to its environment means “dry for the measurement described herein, while high moisture index in comparison to the environment means “wet”.

Measurements has been systematically recorded on an area of every 25m x 5m (5 decks in direction of traffic) by using a grid size of 15cm. The visualization can be seen on the following pages. All measurements to be seen are displayed from above. The metering always starts on the left side. For a better imaging the cross axis was turned fivefold.





Results

The next image shows a scan of one of the scanned decks exemplary. Extracted from these images there are apparent important information:

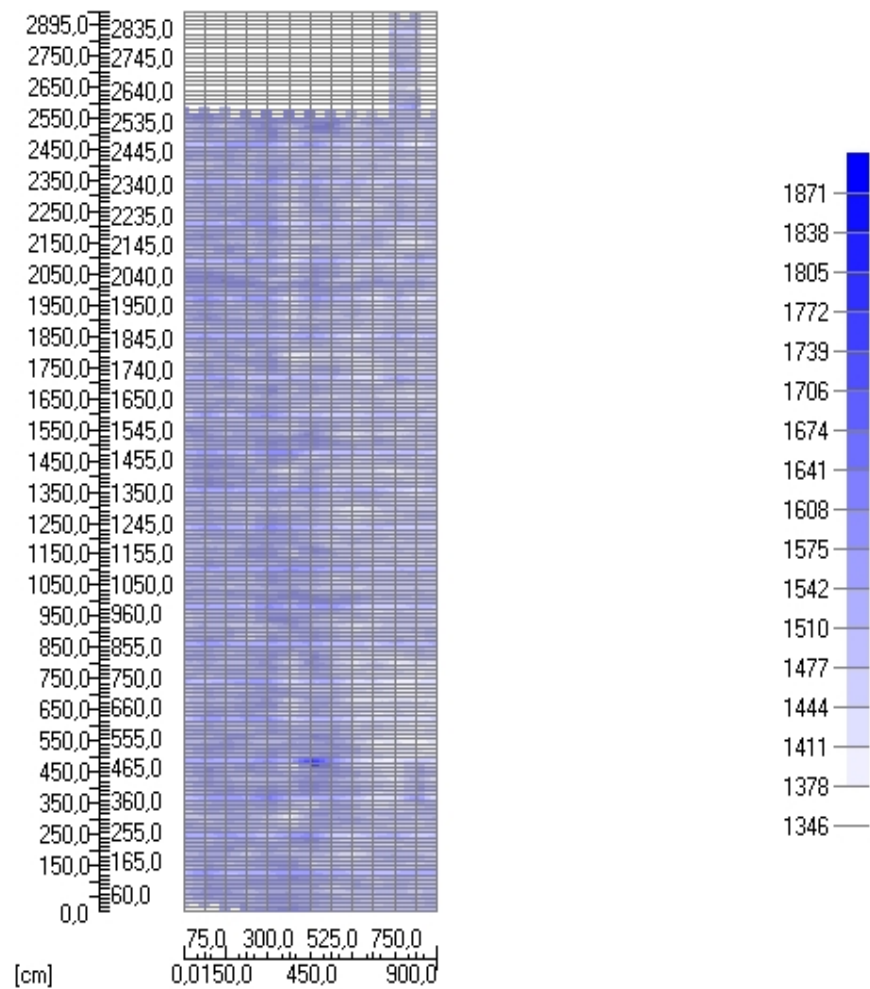


Fig. 1 moisture index-distribution sensor MOIST R2S - surface

The surface scan with MOIST R2 shows slightly distinct moisture alterations in the range of seams. Thus, moisture exposure on the surface is insignificant low.

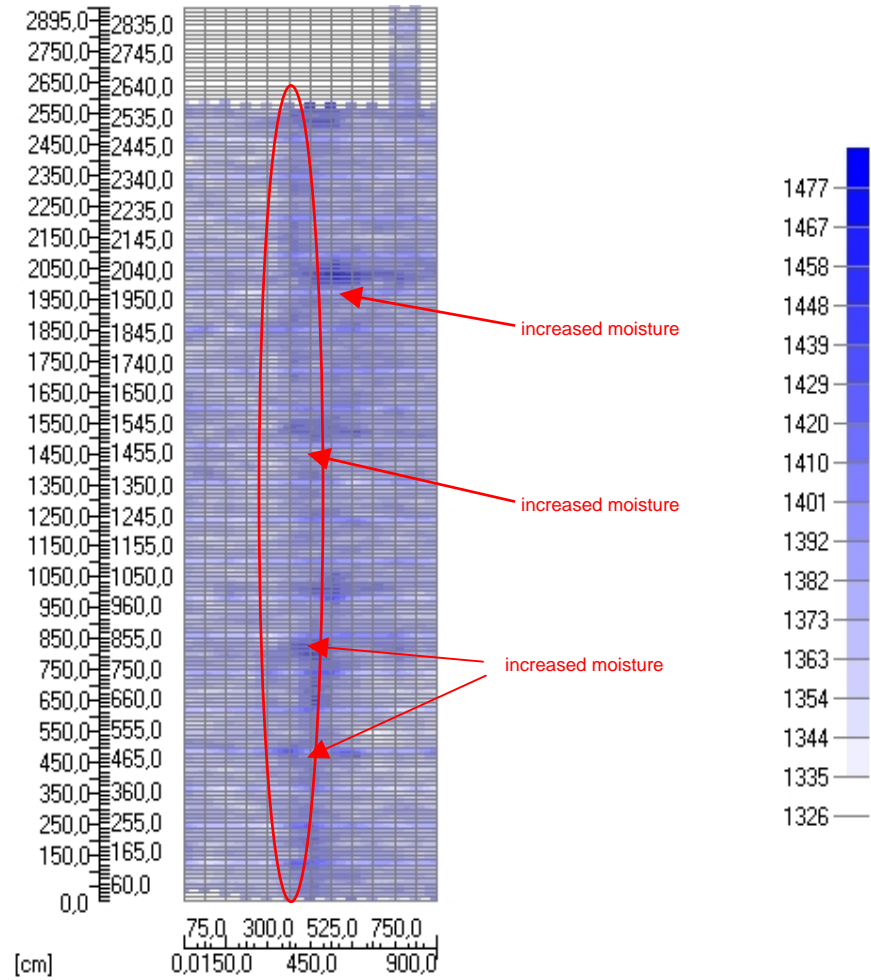


Fig. 2 moisture index-distribution sensor MOIST DS - middle volume layer

The scan of middle layers by using MOIST D shows distinctive regions of a higher moisture exposure in the range of tile spacer and transverse joints. The moisture exposure of middle depths is relatively high as seen on the image above.

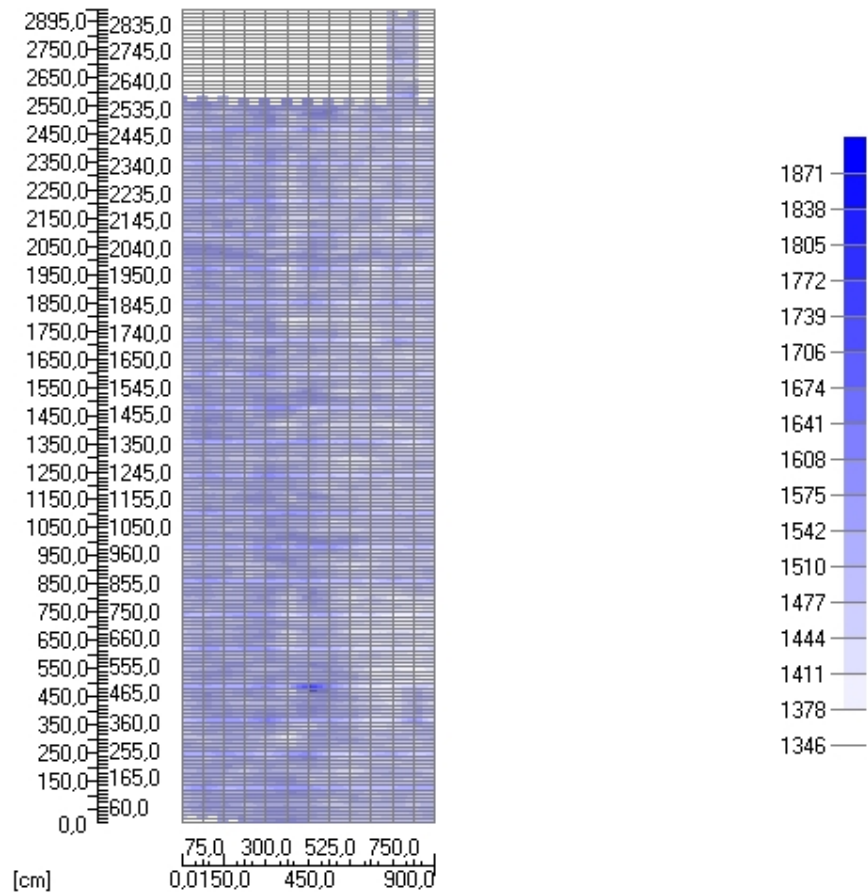


Fig. 3 moisture index-distribution sensor MOIST PS - volume layer

The surface scan with MOIST P shows slight distinct moisture alterations in the range of seams. Thus, moisture exposure inside the volume is low.

Consequently, and as a result moisture exposure of middle layers are at the highest level.