BP Belgacom Antwerpen – Search for leakages, untight locations and water paths on reinforced concrete ceilings of inner courtyard – Moisture Scan from 2009-04-16

On 2009-04-16 we carried out moisture scans in an object of Belgacom, Antwerpen / Belgium. The object had several inner courtyards with basement beneath, where the ceilings made of reinforced concrete were covered with a some centimetre thick bitumen ply. These plies were reconstructed some time ago. In the basements at different places water was found after rain or other precipitation.

The measurement was done to find the areas affected by water ingress in three inner courtyards and to visualize the water paths if possible.

The scan took about 6 hours for a total area of 1700 m² at a lateral resolution of 25 cm, that was completely investigated.

Measurements:

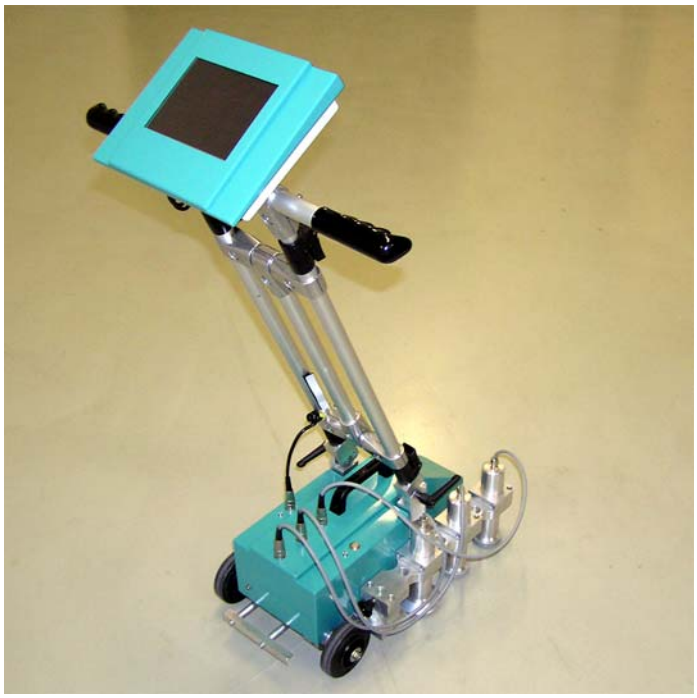
Surface and volume measurements were carried out at the areas of interest in terms of moisture distribution. The measurement was accomplished with the microwave based moisture scanner MOIST SCAN 100.

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”.

The scan was accomplished systematically with a scan grid of 25 cm and visualized as a graphics in the images following. All measurements are in top view. The counting is starting always at left side.



Results

As an example one scan of one of the inner courtyards is shown here. From the scan image important information can be won.

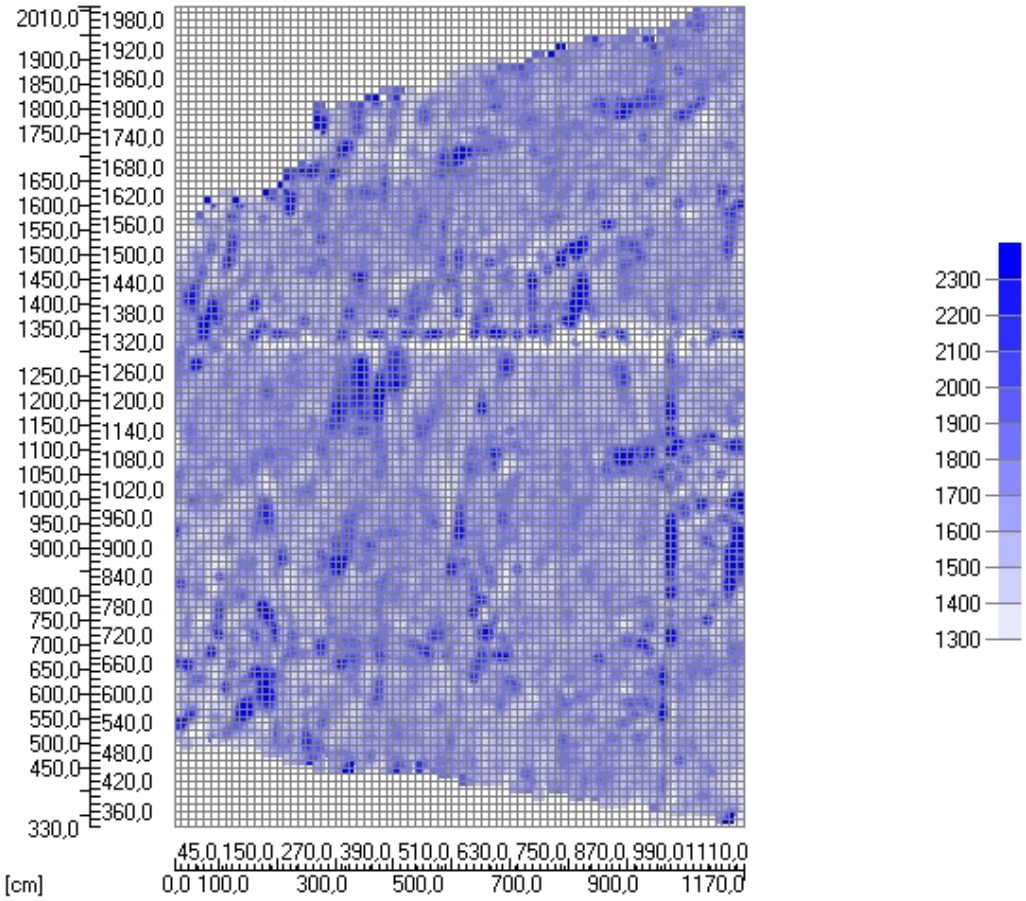


Fig. 1 FI-distribution sensor MOIST R2S – Surface

The surface scan with MOIST R2S shows some single spots with increased moisture above the sealing, but no zones that are associated to each other. Concluding there are no water paths at the surface.

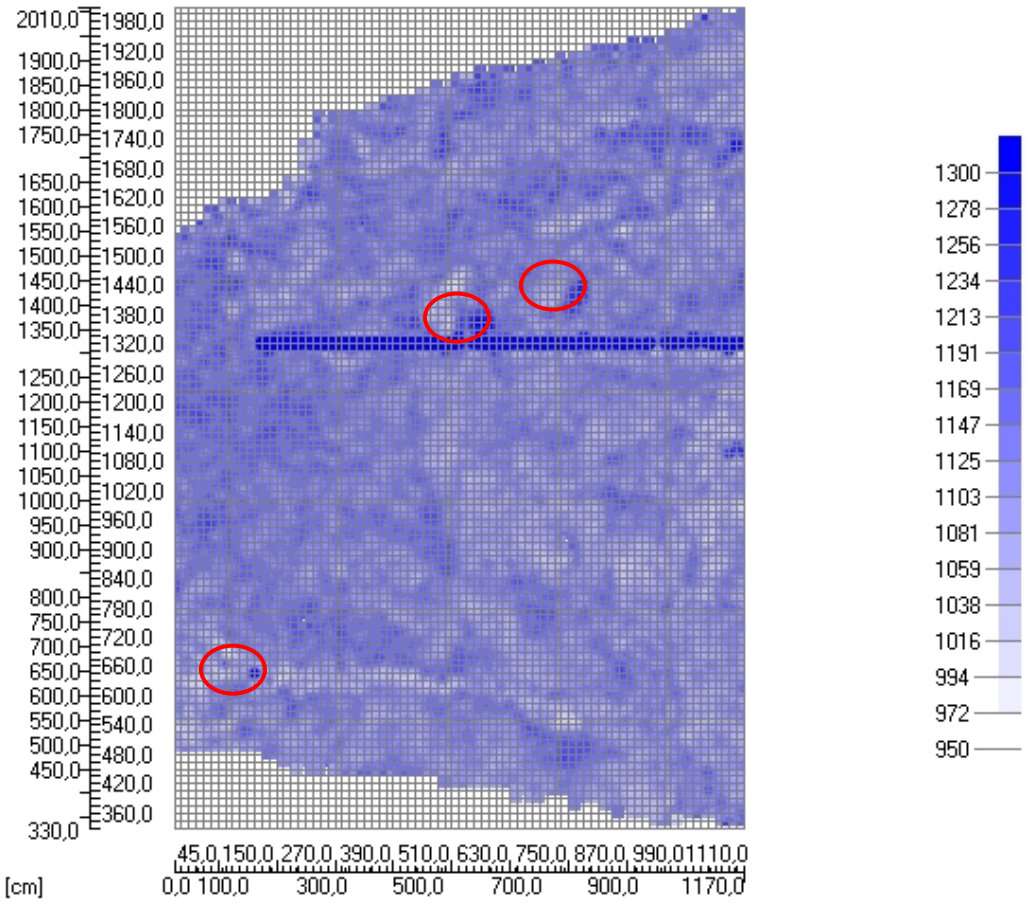


Fig. 2 FI-distribution sensor MOIST DS – Mean volume layer

The scan of mean volume layer with MOIST DS shows few striking spots in a homogeneous moisture distribution, but no moisture isles or water paths. These few striking spots are not sufficient to conclude a water damage.

The dark stripe in the middle of the image is the drainage channel in the courtyard.

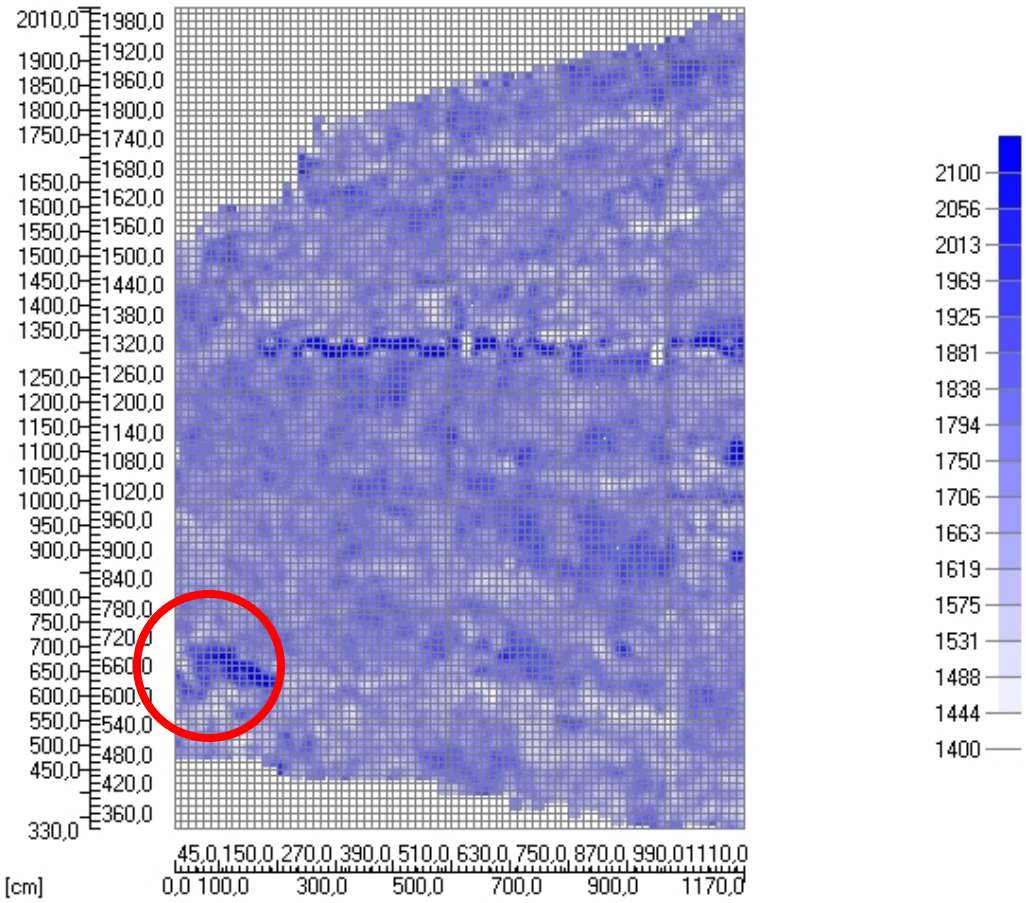


Fig. 3 FI-distribution sensor MOIST PS – Volume layer

The scan of volume layer with MOIST PS – depth region below the ceiling - shows a striking water path left had side in an else homogeneous moisture distribution. In combination with the scan in the mean depth layers this indicates a water ingress from above (wall, roof etc.) or from the side. The left side adjoins a building, so far a leakage is also possible in the area of the connection to the building.

The dark stripe in the middle of the image is the drainage channel in the courtyard.

Concluding a leakage was found in the named area at the left side with high feasibility.