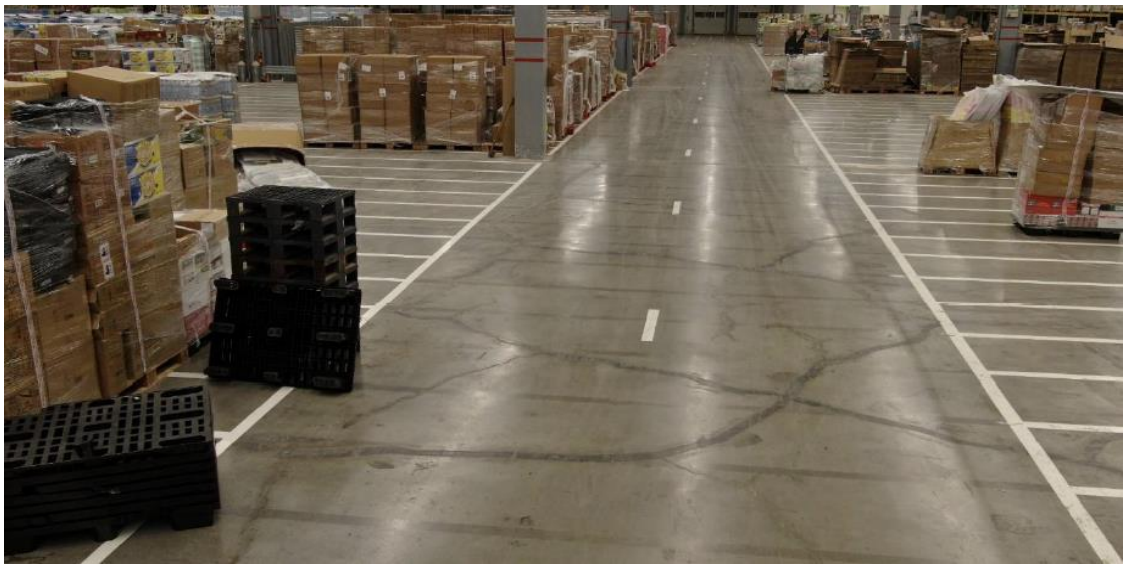
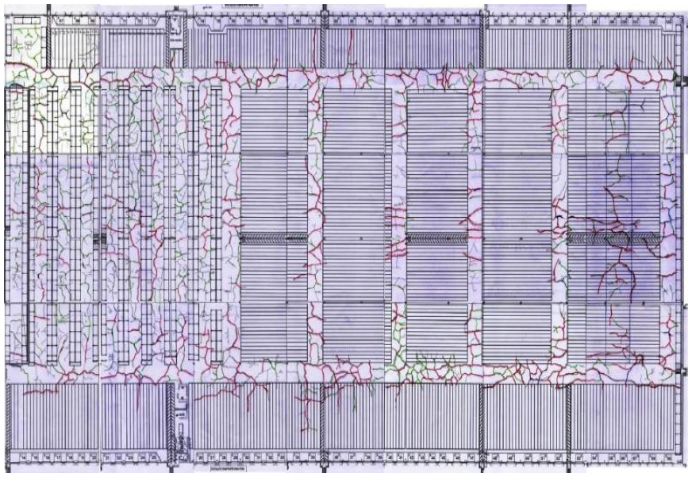
NDTitans in action

Repair monitoring of cracked concrete industrial floor with s'MASH Impulse-Response & DOCter Impact-Echo



The entire concrete floor of a 36,000 m^2 warehouse, built in 2005 in Athens, Greece, suffered from extensive cracking. It was designed with a C25/30 class concrete with 40 kg/m^3 of steel fiber content and it would be supposed to be 18 cm thick.



It was documented that curling of the slabs' corners ocurred and that the first cracks developed a short time after the construction. Progressivelly, more cracks were appearing by the stresses produced by the forklift traffic of the plant's operation.

After a visual inspection and survey of cracks, testing with **DOCter Impact-Echo** was selected to verify the actual thickness of the floor, calibrating the P-wave velocity with some extracted cores. The average thicknes turned out to be no more than 16.5 cm.

Then the **s'MASH Impulse-Response** system was used to quickly identify all the areas with bad support by evaluating the so called parameter "void index".

In general, an area with a value of void index higher than 2 was considered suspicious (red color areas on countour plots). After the testing, some cores from selected locations were taken to confirm the results and gaps below the slabs were clearly identified in all cases.

Case # 001-211123v1

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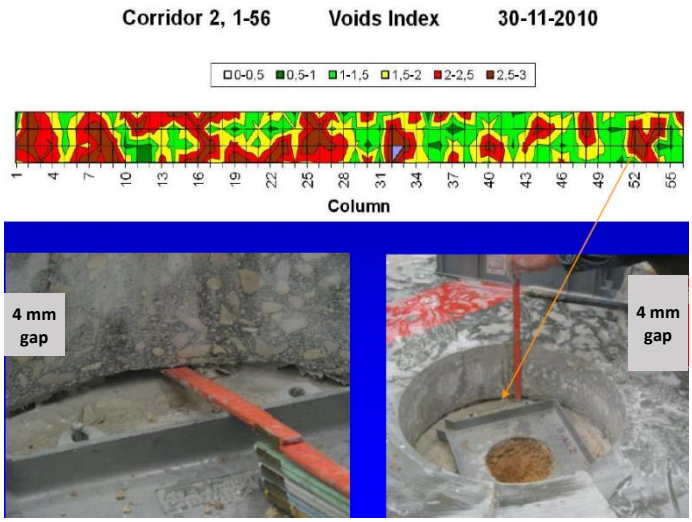


Three different scenarios were evaluated to make the industrial floor fully operational again:

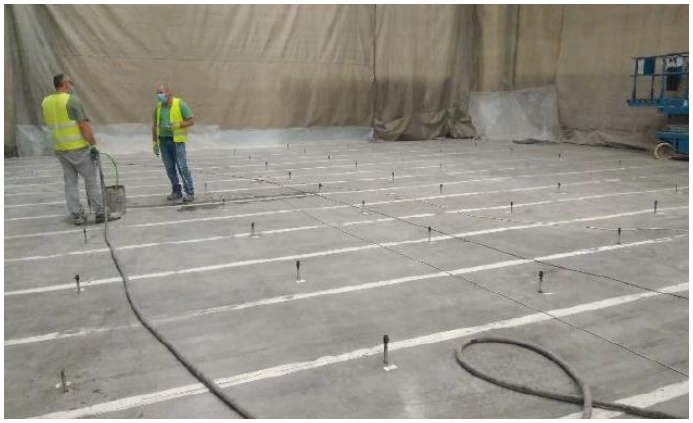
- Demolition and reconstruction
- New concrete floor on top
- Repair of voids and cracks

The owners decided to go for the third option, so the s'MASH contour plots of the different sections were used to cuantify the extent of the problem and estimate the volume and cost of the repair work, as well as a baseline reference for monitoring quality control.

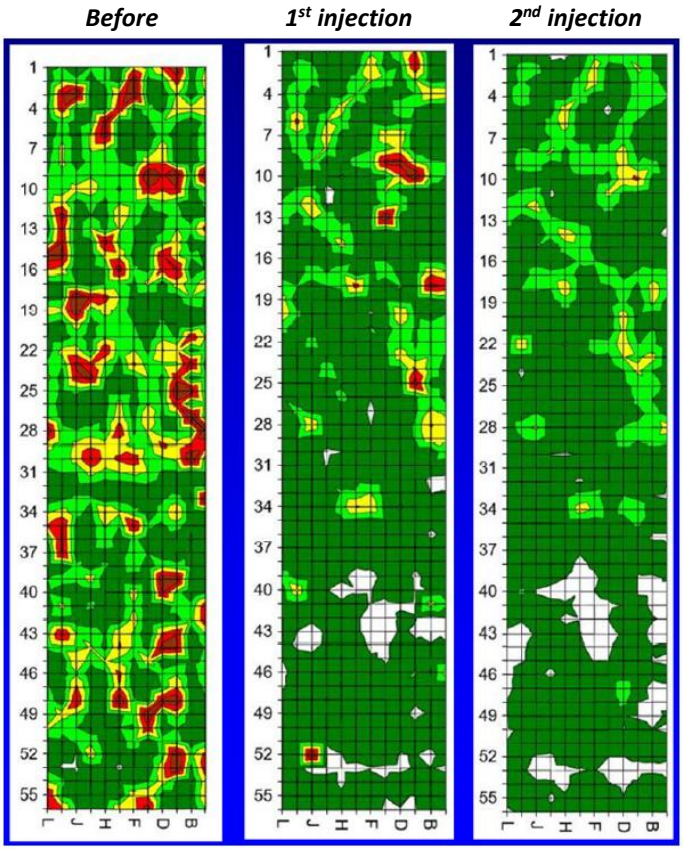
Depending on the width of the cracks, three procedures were carried out to repair them:

- < 2 mm: cleaned and filled up by gravity feed with low viscosity epoxy resin.
- 2 to 5 mm: widened with crack chaser blade and filled up by gravity feed with a flowable epoxy resin + fine quartz sand
- > 6 mm: widened with V-shape cuts, down to a depth of 4 to 5 cm. The bottom part was filled up by gravity feed with a flowable epoxy resin + fine quartz sand, and the V-shaped top part was patched with semi-dry epoxy mortar.

To fill the gaps under the floor, pressure injection of a high flow cementitious grout was carried out through a 1 m triangular grid of injection ports inserted in ϕ=26 mm drilled holes.



After the injection, the s'MASH Impulse-Response survey was repeated to evaluate the improvement of the void index values. In a second fase, the small areas that still showed a void index value higher than 2 were reinjected and reavualated with the s'MASH system. The image below is an example of the results from one of the corridors that was part of the 36,000 m^2 succesfully rehabilitated.



Case study by **NDTitan Nikos Zoides, GEOTEST**.

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