

„Concrete tomograph” – early-age behaviour of massive element



Nerve-Sensors: Case Study

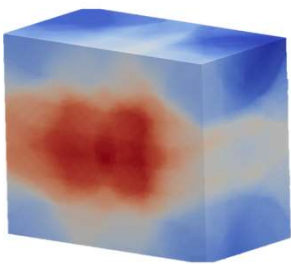
The very challenging experiment was a concrete cube equipped with embedded optical sensors in three directions XYZ. The total number of 75 sections for strain and 25 sections for temperature measurements were created without disturbing the structural performance of the concrete. The research aimed to analyse the spatial behaviour of the massive element during the hydration and shrinkage process, including temperatures and heat transfer.



Benefits of application

- Simultaneous measurements of **strains and temperatures in 3D space**
- Thousands of gauges in a small element **without disturbing its behaviour**
- Unique data about the massive structure for **designing purposes and FEM validation**
- Max. registered strains **ten times higher** than in conventional foil strain gauges

Example results



The 3D network of strain and temperature Nerve-Sensors was successfully embedded inside the cube concreted with self-compacting concrete. The installation process was challenging as there was no reinforcement inside the element. The aim of the cube (35 x 35 x 35 cm) was to simulate the behaviour of massive concrete element during its early age (hydration process). Finally, the spatial picture of thermal-shrinkage strains was obtained in all directions.

- 7 000** measurement points
- 35 m** of sensing path
- 100 x** strain sensor
- early-age** concrete



project
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