

Monitoring of the concrete curing temperature at Ilisu Dam, Turkey

The application of fiber optic temperature measurements allows a detailed recording of the internal temperature distribution in mass concrete components. In contrast to conventional measuring techniques a considerably higher information density is achieved. The danger of thermal cracking within a concrete component can be assessed based on the temperature of zero strain.



Ilisu Dam, Turkey

The outflow of hydration heat from the inside of the construction takes a long time and is highly dependent on the distance to the free surface. These sometimes very different temperature conditions can be recorded with this high-resolution technology. To monitor the temperature within the mass concrete, approximately 170 m of fiber optic cable was installed at the Ilisu Dam. The fibre optic cable was easily installed within the fresh concrete. However, fibre-optic cables can be inserted in the concrete in subsequent drill holes, too. In fresh concrete cables can be fixed to auxiliary structures and their spatial position can be measured.



Fixing the fibre optic cable to auxiliary constructions

Along the cable, the temperature evolution induced by curing of the concrete was measured for a period of more than two months in order to assess the state of the concrete blocks for further construction work. The temperature can be measured with a spatial resolution of 0.25 m and 0.1 K. The hydration heat in concrete may lead to thermal tension and cracks. A detailed gathering of the internal temperature distribution of building elements enables the risk assessment of the formation of thermal cracks and the optimisation of the dam construction.