

Reference Engineering Dubai Metro

Optimizing of the concrete mixture and the concreting processes



Problem and task

Up to 2.0 million cubic meters of concrete with the highest requirements to durability and early strength are used for the construction of Dubai Metro. Unexpected fluctuations of the surrounding temperature and supply gaps in the distribution of selected raw material (e.g. microsilica) lead to a sinking compressive strength and other losses of quality characteristics. For the construction of massive supporting members with diameters of up to 2.4 m it was necessary to estimate the risk of thermally induced cracking. The definition of the time of concreting, construction process and curing was crucial to avoid durability problems.

Solution

During an in-situ analysis of the concrete production processes, formulations and base material by our consultants, there were found three measures which lead to a strong improvement in quality.

- Selection of suitable additives.
- Reduction of the content of the used types of microsilica with strongly fluctuating quality.
- Establishment of a reliable controlling plan with check and measure lists to remove the problems fast and goal-directedly.

Due to a tight schedule it was not possible to make

Facts

Duration of the project:
October 2006 to January 2007

Building owner:
United Arab Emirates –
Emirate Dubai.

Client:
Japan-Turkey Metro Joint
Venture (JTMJV).



tests in advance referring to the risk of cracking in massive supporting members. For this reason, numerical computer simulations based on known concrete properties were made which could realistically predict the development of temperature and cracking. A final parameter study led to the definition of the optimal concreting moment and curing. Using this information, it was possible to avoid the development of cracking despite the massive construction method.

Description

With the measures taken the quality of the concreting work could be re-established and - for the quick local realization - a delay of the project avoided. Our consultants' great experience and the use of modern equipment (computer simulations) made it possible.

