BASF push the boundaries of concrete engineering at Burj Khalifa

The background

Burj Khalifa was designed to be the centrepiece of a new development in an area previously derelict for many years. The World’s tallest free-standing structure is now at the centre of a mixed-use development called Downtown Dubai combining 30,000 homes, 9 hotels, 19 residential towers, lakes and parkland in a total area of 2km².

The challenge

The Burj Khalifa now stands at over 800m tall. To reach this world record the structure of the building had to comply with strict design and durability criteria. One unique challenge was ensuring the concrete mix design for the structural core of the tower was capable of being pumped to formidable heights. The structural core of the tower required nearly 170,000m³ of concrete designed for 80N/mm² compressive strength.

Project:
Burj Khalifa

Location:
Business Bay, Dubai, UAE

Project Completion:
2010

Owner:
Emaar Properties

Contractor:
Arabtec/Samsung/Besix JV

Concrete producer:
Unimix

Designer:
Skidmore, Owings & Merrill

Market sector:
Commercial/Residential

Products used:
MasterGlenium SKY 504
650,000 liters
MasterGlenium 110UN 75,000 liters
MasterGlenium Stream2 19,000 liters
Our solution

A series of concrete trials preceded initiation of the project and BASF’s MasterGlenium SKY 504 met the contractor’s exacting requirements. It was the only concrete admixture that could offer the combination of early strength and workability retention at ambient temperatures of above 45°C in a mix to be pumped to a height of at least 600m - using a single pump at ground level.

Advantages at a glance:

Getting the mix right – consistently – was critical. Concrete pumps employed a pair of pistons to push the mix through a pipeline to the point of delivery. There is enormous pressure on the concrete in the pipeline from the pistons at these record-breaking heights. In addition, there is the weight of the concrete itself to factor in. Any deficiency in the mix design would create a blockage in the pipeline. MasterGlenium SKY enabled exacting mixes to be supplied consistently, on an industrial scale, and pumped to the required heights. The hyperplasticiser achieved 100Mpa working on a water cement ratio of just 0.27.

Other BASF structure references:

- Al attar tower - Dubai
- Dubai arch tower - Dubai
- Infinity Tower - Dubai
- Jebel Ali Power Station - Dubai
- Dubai Airport Expansion - Dubai
- Grosvenor House Hotel - Dubai
- Palm Jumeirah Sewage Works - Dubai
- Adwea Headquarters - Abu Dhabi
- Al Jaber Tower - Fujairah

Contact

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