



PUTZMEISTER'S SPECIALLY-DESIGNED BSA 14000 SHP-D REACHED A WORLD RECORD VERTICAL CONCRETE PUMPING HEIGHT OF 1,988 FT. (606M) TOPPING OUT BURJ KHALIFA, (PREVIOUSLY KNOWN AS BURJ DUBAI) THE WORLD'S TALLEST BUILDING AT 2,717 FT. (828M) HIGH, IN THE UNITED ARAB EMIRATES.

"This extreme pump height was possible due to the trust and cooperation developed between the Samsung-led team, the concrete supplier and pumping service for the project, Unimix, the local Putzmeister agent German Gulf Enterprises (GGE), as well as Putzmeister Concrete Pumps GmbH," says Christian Stirm, application engineer at Putzmeister's global headquarters in Aichtal, Germany.

Unimix first broke its own record with its BSA 14000 SHP-D trailer pump while on Burj Khalifa in May 2007 for reaching a pumping height of 1,483 ft. (452m). Shortly after in August 2007 they reached 1,749 ft. (533m), and then in November 2007, broke the world record again by pumping to a height of 1,971 ft. (601m). And in April 2008 they reached the current world record for vertical concrete pumping at a height of 1,988 ft. (606m).

To achieve the concrete pumping record-breaking height for the three-winged tower located in central Dubai, both Putzmeister Aichtal Works and GGE started preparations in early 2005.

Once on site, Unimix, deployed a carefully designed concrete placing system including two Putzmeister BSA 14000 SHP-D trailer-mounted concrete pumps and one BSA 14000 HP-D trailer-mounted concrete pump; a carefully engineered delivery line system; four non-ballasted stationary placing booms (three MX 28-4 T and one MX 32-4 T placing booms); and various truck-mounted boom pumps.

"We conducted extensive tests with the BSA 14000 HP-D pump and delivery line on-site," says Stirm. "The tests were conducted with horizontally laid pipelines to simulate the pressure behavior and expected friction of the concrete in the pipeline based on concrete mixture breakdowns, as well as converting it to the high-rise pumping."

Putzmeister's specially-designed BSA 14000 SHP-D reached a world record vertical concrete pumping height of 1,988 ft. (606m) topping out the Burj Khalifa, the world's tallest building at 2,717 ft. (828m) high, in the United Arab Emirates.

Putzmeister was faced with the challenge of creating a new, super high-pressure trailer pump, the BSA 14000 SHP-D, specifically for this project. The pump's frame and hopper were reinforced in order to withstand the enormous forces of the concrete mixtures. Other characteristics of the new pump include: adjusted S-Valves and S-Valve bearings for the expected pressures and a high-tech filter system.

BSA trailer pumps were combined to create one pump station for this project. The pumping station pumped approximately 5,826,920 cu. ft. (165,000m³) of high-strength concrete during the 32 months of operation.

Three of the trailer pump delivery lines were connected to the three MX 28-4 T placing booms, which were secured on platforms of an auto-climbing formwork and stood on 52-ft. high (16m) tubular columns for the structure's wing sections.

Throughout the entire project, only high compressive strength concrete mixtures were used and pours were only done at night because of hot temperatures during the day. Concrete was chilled in the concrete plant prior to preparation and part of the water was replaced with shards of ice, allowing the concrete to be transferred at 82°F (28°C) (night-time temperatures in Dubai usually reach 104°F) to the project site.

"Each batch of concrete was monitored and logged in at the plant," comments Stirm. "Before transferring the concrete to the pumps, the temperature and flowability were checked regularly and sample cubes of the batches were poured to check pressure.

"Putzmeister engineers developed a unique delivery line system where the line's wear behavior, its compressive strength and routing throughout the structure was considered."



In April 2008 the world record for vertical concrete pumping at a height of 1,988 ft. (606m) was achieved.



Three BSA 14000 trailer pumps were combined to create one pump station for this project.

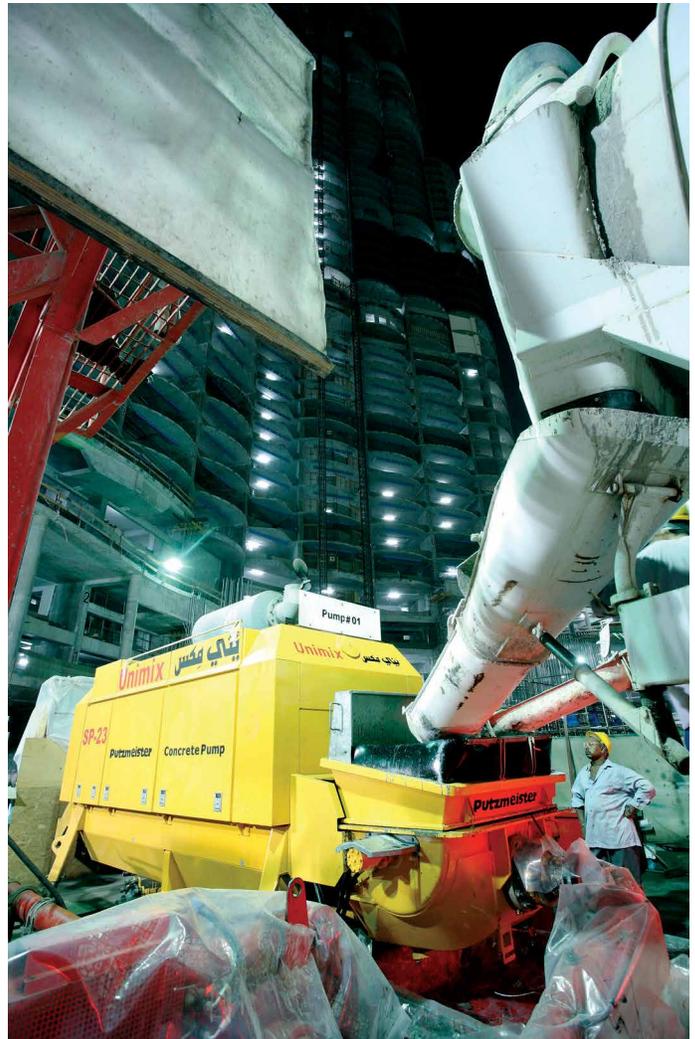
ACCORDING TO STIRM, THE STRUCTURE'S 75,347 FT² (7,000M²) FOUNDATION WAS PLACED BY NUMEROUS PUTZMEISTER TRUCK-MOUNTED BOOM PUMPS. THE FOUNDATION IS SUPPORTED BY 200, FIVE-FT. (1.5M) DIAMETER CONCRETE PILES FOR THE CORE TOWER AND 650 CONCRETE PILES FOR THE TOWER'S WING SECTIONS.

As fireworks adorned Burj Khalifa from top to bottom at its grand opening on January 4, 2010, there was much to celebrate:

- Not only is Burj Khalifa the world's tallest building, it's the world's tallest structure and tallest freestanding man-made structure in the world at 2,717 ft. (828m).
- The spire can be seen from as far as 59 miles (95km).
- Burj Khalifa has over 160 stories, the highest number of stories in the world.
- At the 124th floor is the world's highest and only publicly accessible observation deck with an outdoor terrace. It offers a spectacular view of the 297-acre (120-hectare) site that holds space for 30,000 apartments and the world's largest shopping center – the Dubai Mall.
- 160 luxury hotel rooms and suites; 1,044 residential apartments; 49 office floors including the 12-floor annexure and 57 elevators, one of which has the longest travel distance and is the tallest service elevator in the world at a height of 1,654 ft. (504m).
- 3,000 underground parking spaces.
- 12 ft. 2 in. (3.7m) is the thickness of the foundation's concrete mat.
- 28,261 glass-cladding panels make up the exterior and its two annexes.
- 3,964 gallons (15,000L) of water collected from the tower's cooling equipment is used for landscaping irrigation.
- 69,225,150 pounds (31,400 metric tons) of steel rebar was used in the structure.
- 1,082,677 ft³ (330,000m³) of concrete was used to build the tower.
- 1,325 is the number of calendar days it took for Burj Khalifa to become the tallest freestanding man-made structure.
- 12,000 workers were on-site during the peak of the tower's construction.
- It took 22,000,000 man hours to build the tower.
- 12,000 people are expected to live and work at Burj Khalifa.



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Billed as “a living wonder,” “stunning work of art” and “incomparable feat of engineering,” there is no doubt that Burj Khalifa has pushed Dubai into the international spotlight. As thousands of workers brought to life the world’s tallest building, Dubai’s innovative spirit was also born.



6 Three MX 28-4 T and one MX 32-4 T placing booms, in addition to various truck-mounted boom pumps, were on site to place the concrete.



7 Throughout the entire project, only high compressive strength concrete mixtures were used and pours were only done at night because of hot temperatures during the day.