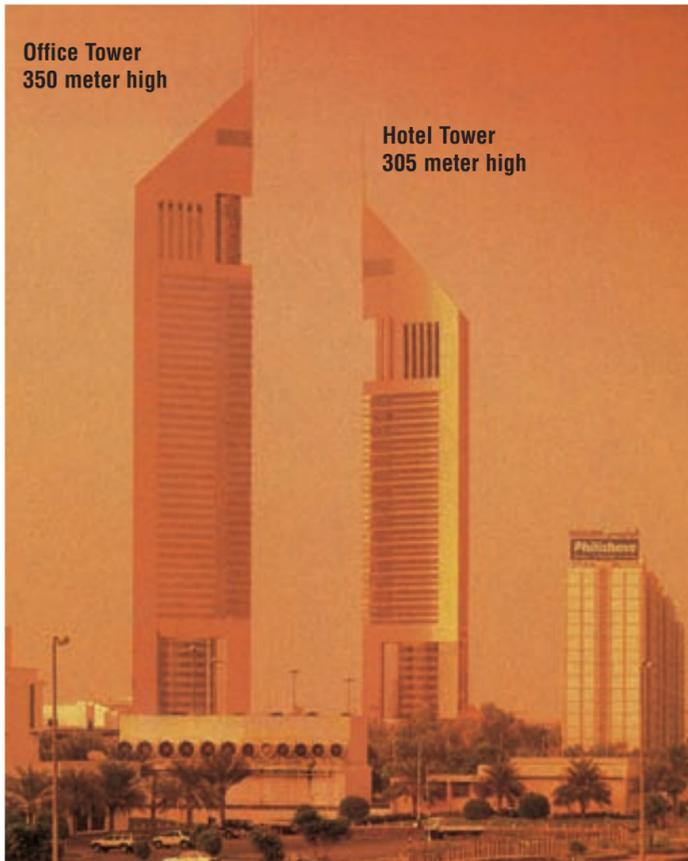


The five star hotel tower is expected to be fully operational in February 2000, offering 400 bedrooms, including 40 luxury Suites, with three main theme restaurants contributing to a total of 10 outlets throughout the complex. The state-of-the-art office tower contains 68,500 square metres of floor area designed to offer unrivalled flexibility and efficiency to a range of businesses. A five-level podium building connects the two towers, incorporating a Shopping Boulevard with 9,000 square metres of floor space over two levels, the Podium building also houses underground parking.

The construction of this prestige building was awarded to two separate constructors:

- Hotel Tower Construction  
Besix (Belgium) & Ssangyong (Korea)
- Office Tower Construction  
Nasa Multiplex (Australia)

Each of these constructors chose a different method of working, posing an interesting challenge for the placing of the concrete. The complete structure contains 145,000 cubic meters of concrete supplied by the company of Unimix (Dubai).



### Construction Methods

The Concrete supplied used local crushed aggregate which is of a porous nature. In order to be able to pump at the pressure required to reach the higher levels of the building Micro Silica was added to the mix. The addition of Micro Silica ensured that the concrete slump remained constant during the high rise pumping, an extremely important factor when Slip Forming. The major pours were mainly made during the night in order to keep the concrete temperature as low as possible. In Dubai daytime temperatures of 45 to 50 °C in the shade are not unusual.

### Concreting at extremely high temperatures



For this project the aggregate storage area was covered with sun shades and cooled water used to make the concrete, in order to stay below the maximum allowed concrete placing temperature. In Dubai and other countries with high temperatures and high sunshine ratings, when a relatively low concrete

placing temperature is required, the aggregate storage area can be covered with simple sun shades and/or the large aggregates sprinkled with water. In the majority of cases these simple and inexpensive methods can save the necessity of investing in an ice flake unit.

The hotel tower was constructed using conventional Peri SC form-work, however the elevator core was cast ahead of the floor slabs and was on average 4 or 5 floor levels above the next slab to be cast. This situation prohibits using the floor slabs to support or accept the horizontal loads generated in the column of the distribution boom. In order to accommodate this unusual situation Putzmeister supplied a unique climbing system allowing the distribution boom MXR 32-T to self-climb inside the elevator shaft.

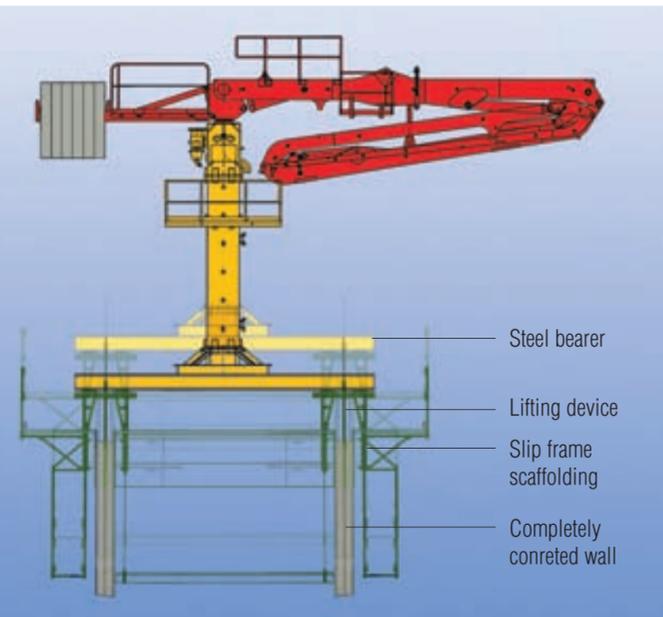
The concrete was conveyed by means of the BSA 14000 HP-D stationary concrete pump through high pressure concrete conveying pipe-line ZX DN 125-200 bar (Fig. 2) to a stationary, hydraulically operated self climbing distribution mast. This distribution mast was positioned in one of the elevator shafts.

An hydraulically operated shut off valve GVH 2/2 ZX 125 operated by the hydraulic system of the concrete pump closed the concrete conveying line when necessary.

Upon completion of a concreting operation, the line was closed by means of the hydraulic shut off valve. The elbow directly behind the concrete pump was removed after which the concrete pump, hopper, valve and conveying cylinders, as well as the removed elbow, were cleaned with water (Fig.3).

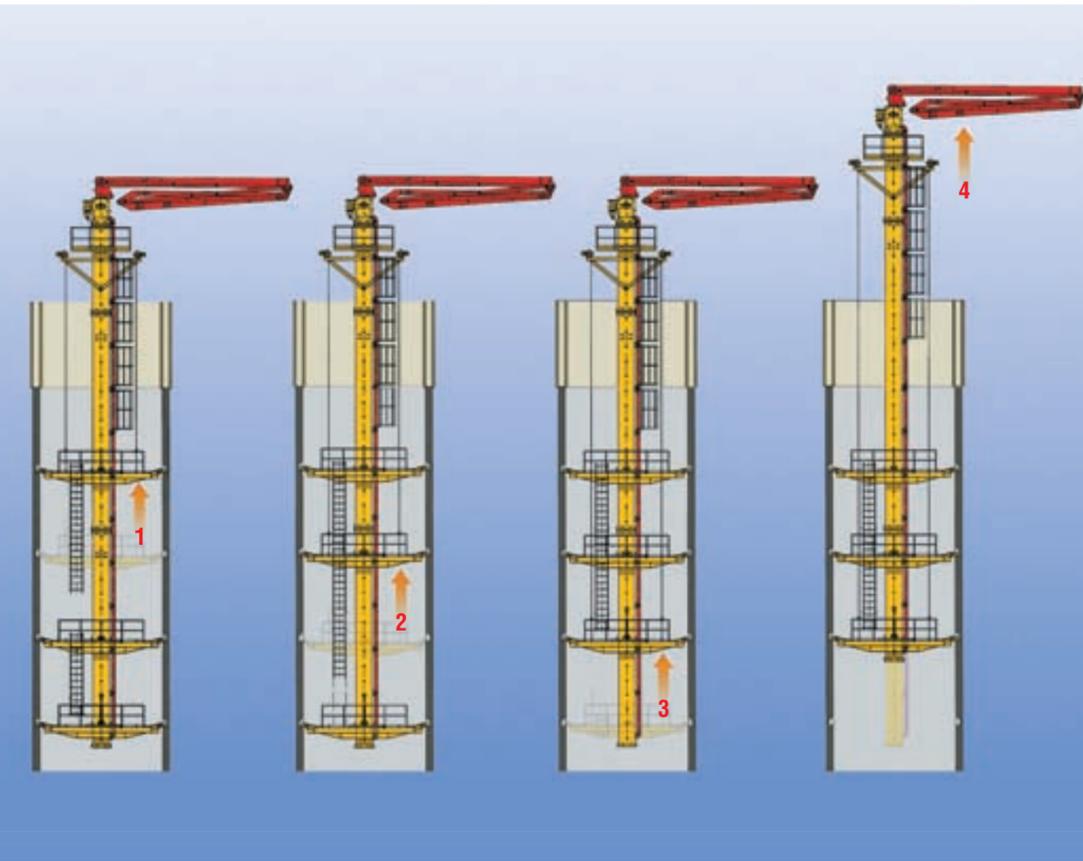
The hydraulic operated shut off valve was then connected to the cleaning station. For cleaning purposes an empty truck-mixer was positioned under the cleaning station, so that when the hydraulically operated shut off valve was opened the concrete in the conveying pipeline was discharged into the truck mixer. The end-hose was removed from the mast and a rubber cleaning ball inserted into the pipeline. This ball was then pumped by means of compressed air back down the pipeline to the cleaning station thus removing all concrete from line. By means of the hydraulic shut off valve the momentum of the concrete descending in the pipe-line could be controlled.

The office tower was constructed using Slip form-work supplied by Structural Systems Engineers & Contractors. This method of construction required that the distribution boom be mounted on top of the slip form platform and thus rose with the form-work. In order to support the weight of the distribution boom extra hydraulic jacks were incorporated into the slip-form and additional steel bracing provided to accept the static forces arising during the operation of the boom. The maximum climbing speed of the form-work was approximately 300 mm per hour. Underneath the slip-form platform a scissors arrangement was incorporated into the pipeline in order to allow the distribution boom to receive concrete while the form-work was climbing (Fig 4). The supply of concrete to the boom on the slip-form was also from a BSA 14000 HP-D analogue to the hotel tower.



### The climbing process in detail

The forces from the climbing boom and tubular column are fed from the lower frame into the shaft walls. Before the climbing process commences, the placing boom winches the upper and then the middle climbing frame upwards into its new position. Then the catches are released with which the frames are anchored into the shaft walls. The weight of the concrete placing boom is now carried via bolts in the middle frame into the shaft walls. The hydraulic cylinders that are connected to the lower guiding frame are connected to the lower guiding frame so that the lower frame can be pulled upwards with the winches. The cylinders are then reconnected to the boom bolts. The bolt connection in the middle climbing frame is again released so that the hydraulic cylinders can lift upwards step by step from the lower guiding frame (i.e. from one bolt hole to the next). The upper and middle frame now only serve as a guide. In this way the concrete placing boom, on its column, climbs upwards in the shaft.



### Treating the fresh concrete

The dark coating visible on the exterior walls of the main shafts is a Chemical Agent. The agent is used in hot countries to prevent the loss of moisture from the fresh concrete thus maintaining the required strength of the surface and avoiding surface cracks.





Such night-time pours as seen here are typical in the UAE and many other countries where the daytime temperatures are very high. Working at night is not only cooler for the personnel but assists in reducing the temperature of the concrete placed. Night-time pours are also a useful means of avoiding the day-time traffic jams where concrete is delivered from off-site batching plants.

Distribution of concrete using a Putzmeister hydraulic distribution boom MXR 32-T

### Concrete placing at it's best

Placing concrete at night calls for the full concentration of all concerned as well as a well trained team in order to ensure maximum performance and quality with no risks to the personnel. Under such circumstances it is essential to be able to totally rely on the performance of the concrete placing equipment.

The Emirates Towers in Dubai was a prime example of the excellent performance of Putzmeister AG and their equipment, starting with technical advice during the planning stage onto the supply of the most modern and powerful concrete pumps in the world and concluding with regular site visits to ensure the required performance.



The General Manager of UNIMIX together with the responsible Putzmeister Regional Manager



Hydraulic distribution boom operator

## Site report

# Dubai's Towering Twins Topped Out Six Months Ahead Of Schedule



Two of the worlds' most powerful concrete pumps together with distribution booms and unique climbing equipment played a major role in the construction of the Emirates Towers in Dubai / UAE.

Dubai's twin Emirates Towers, one of which is the tallest building in the Middle East and Europe and the 10th tallest in the world, have been topped out a remarkable six months ahead of schedule.

The office block soars 350 metres, while its sister tower is the world's third tallest hotel, at 305 metres. This spectacular pair of triangular shaped sky-scrappers are the third tallest set of towers on the planet.



The successful completion of this challenging concrete placing project was a product of an excellent co-operation between:

The Ready-mix supplier:  
**Unimix L.L.C.**

The construction companies:  
**Besix-SsangYong J.V.**  
**Nasa Multiplex L.L.C.**

The slip-form-work manufacturers:  
**Structural Systems Engineers & Contractors**

The Putzmeister local agent:  
**German-Gulf Enterprises Ltd.**

and the  
**Putzmeister AG team.**

**Putzmeister Products and Services**  
Concrete Pumps · Industrial Technology PIT · Telebelt ·  
Mörtelmaschinen GmbH · Dynajet High Pressure  
Cleaners · Services · Concrete Project Division CPD ·  
Consulting and Data Technology · Academy

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