

Guangzhou TV-tower

Introduction

The city of Guangzhou has almost completed the work on what will be one of the tallest buildings in the world – Information Based Architecture (IBA) and Arup worked collaboratively to win the commission for the design of *the new TV Tower* for the City of Guangzhou, which will be the host city for the 2010 Asian Games. The tower will be one of the tallest buildings in the world - reaching 610m in height and is hoped will attract 10 000 visitors daily.

The Competition

The international competition was held in 2004 for the design of the tower, a 17.9ha park at its base and the master-plan for the surrounding 56.6ha which includes an elevated Plaza, pagoda-park, retail facilities, offices, television centre and hotel.

Female tower

Mark Hemel, IBA architect and director, comments, " Where most skyscrapers bear 'male' features; being introvert, strong, straight, rectangular, and based on repetition, we wanted to create a 'female' tower being complex, transparent, curvy and gracious. " "Our aim was to design a free-form tower with a rich and human-like identity that would represent Guangzhou as a dynamic and exciting city. We therefore wanted it to be non-symmetrical so that the building would look as if 'in movement' and 'alive'. The result is a tower like a 'sexy female', the very reason that earned her the nickname: 'super-model'."

The twist

We designed a 610-metre-tall twisted, tapering tube. The form, volume and structure are generated by two ellipses, one at foundation level and the other at an imaginary horizontal plane just above 450 metres. The tightening caused by the rotation between the two ellipses forms a 'waist' and a densification of material. This means that the lattice structure, which at the bottom of the tower is porous and spacious, becomes denser at waist level. The waist itself becomes tight, like a twisted rope; transparency is reduced and views to the outside are limited. Further up the tower the lattice opens again, accentuated here by the tapering of the structural column-tubes.

Programme

The Guangzhou TV & Sightseeing Tower consists of 37 floor of programme including exhibition spaces, a conference centre, a cinema, several restaurants, cafés and observation decks. A deck at the base of the tower hides the giant building's functional workings. All infrastructural connections – metro and bus stations, and a pedestrian link to the northern embankment of the river – are met underground. This level supports other facilities as well, including a museum, a food court, extensive commercial space, a 600-vehicle parking area for cars and tourist coaches. The entrance operates on two levels, one a continuation of the landscape above ground, the other connected to the mass-transit and underground-parking facilities. Slow-speed panoramic and enclosed high-speed double-decker lifts serve both entrance levels.

The intermediate zone form +80m up to +170m consist of facilities like a 4D cinema, a play-hall area, restaurants, coffee shops and outdoor gardens with teahouses.

The top zone of the building begins above the stairway, housing various technical functions as well as a two-storey rotating restaurant, a damper and the upper observation levels. From the upper observation levels it is possible to ascend even higher, via a further set of the stairs, to a terraced observation square rising above the tower's top ring, high above the booming city of Guangzhou.

Sky-walk

Spatially the tower reads like a series of mini-buildings hung within the super-structure, with 'mega spaces' in between. These mega-spaces in between the mini-

buildings are in fact floating gardens each varying in atmosphere; transparent, light and open at the base, and more closed and shaded at the waist of the tower.

Between level +170 meter and level +350 meter an open air staircase will lead the public all the way up through the narrow waist of the building. Here visitors can investigate the structure from close by while they are given a physical experience of the size of the tower.

Structural description

The structure consist of a open lattice-structure that is twisted over it's axis, therefore creating a tightening waist halfway up the building. This twist has created a slender grace-full profile.

The design of the lattice-grid is not only a structural one but is also driven by esthetic and architectural and environmental considerations.

The build ability of the nodes was an important challenge while designing the 610meter tall Guangzhou TV and Sightseeing tower.

Although none of the 1100 steel nodes are identical, we succeeded in creating one single type of node.

Site-progress

Since the initial winning of the scheme, the design has been developed and wind tunnel tests, fire- and load tests have been completed. Performance-based approaches have been adopted to achieve breakthrough on the local regulations on planning, fire escape and structural design issues. The groundbreaking ceremony took place in November 2005 after which the foundation and piling, (24 x 4m diameter piles) have been constructed.

The steel structure of the main building was completed in November 2008. What is remaining is the 160m tall mast, which is being built currently. The thinner upper 80m of the mast is being constructed inside the wider and lower part of the mast. In may 2009 the upper part will be jacked into position, and the mast will be completed. The tower is due to be completed at the end of 2009, in order to be fully operational for the 2010 Asian Games.

Facts:

April - August 2004

November 2005

Completion date

First Place in Invited International Competition

Ground breaking ceremony

December 2009

Gross Floor Area: 114.000sqm

Height: 610m

Client: Guangzhou Construction Investment & Development Co, Ltd, Guangzhou TV station

Architect:

Information Based Architecture

Mark Hemel & Barbara Kuit

Engineer: Ove Arup & Partners Hong Kong Ltd.

LDI: Guanzhou Design Institute

Number of Floors above ground: 37
Number of underground floors: 2

Program:

+459.2	viewing deck / entertainment
+454	viewing deck (refuse zone)
+448.8	services room
+443.6	services room
+438.4	sightseeing deck
+433.2	sightseeing deck
+428	rotating restaurant
+417.6	rotating restaurant
+412.4	kitchen
+407.2	VIP restaurant
+402	transmission room
+396.8	transmission room
+391.6	transmission room
+386.4	transformer room
+381.2	microwave transmitter (city)
+376	microwave control room (province)
+355.2	podium garden
+350	refuse floor
+344.8	tea room
+339.6	plumbing control
+334.4	services room
from +173.2 to +334.4 skywalk	
+173.2	podium garden
+168	viewing deck
+162.8	food court
+152.4	food court
+147.2	services room
+121.2	podium
+116	podium garden / refuse
+110.8	4D cinema
+105.6	4D cinema
+100.4	4D cinema
+95.2	4D cinema
+90.0	4D cinema
+84.8	services / 4D cinema
+32.8	refuse floor
+27.6	offices services
+22.4	conference centre / offices
+17.2	exhibition hall
+7.2	entrance / ceremony hall / public plaza
-0.6	entrance / taxi drop off / exhibition hall / retail / coach station
-5.8	600 car parking / link to Metro station / link to Light railway
-11	bomb shelter

Area landscape: 17.4 hectares

Capacity: 5 million visitors per year

Number of lifts: 2 double-decker panoramic lifts
2 double-decker high speed lifts
2 fire fighter lifts
8 shuttle lifts (for circulation within zones)