International Milestone RCC Project

Longtan Dam

in China

Dam type	RCC gravity dam
Flood discharge structure	7 surface outlets 2 bottom outlets
Installed capacity	6300WMwith 9 hydrogenerators (initial stage 4900WM)
Navigation structure	Two-step vertical ship elevator
Length of crest of RCC dam	849.44m
Height of dam	216.5m
Dam concrete volume	6.6 million (in which 69% is RCC)
Normal water level	400m (initial stage: 375m)
Construction period	Started:2001-07-01 Completed: 2009 Total: 9 years
River closure	Dec. 2003
Impoundment	2006-09-30
Power generation of the first unit	2007-05-25

Introduction of Longtan Hydropower Project

Longtan Hydropower project is one of the ten symbol projects in the national western development and one of the strategic projects in the “Power Transmission from the West to the East”. It is also the critical controlling project in the cascade development of Hongshui River. Longtan Hydropower station is located on the Hongshui River in the Tian-e County of Guangxi Autonomous Region. The dam site is 15km from Tian-e County. The project is mainly used for power generation. It also has flood prevention, navigation and other comprehensive benefits.

As three major structures of the Longtan Hydropower Project, the dam (216.5m in height), underground powerhouse (388.5m in length, 28.5m in width and 74.4m in height) and vertical ship elevator (maximum hoisting height of 179m) are all the greatest in the world.

Innovative Progress on Longtan RCC Dam

The dam crest of the Longtan RCC gravity dam is 849.44m long. The concrete volume of the dam is 6.6 million m^3, in which 69% are RCC.

- The whole dam was constructed with RCC except that CVC was used in the foundation. GEV RCC together with II grade RCC in upstream side was used as seepage control scheme. The thickness of GEV RCC was only about 1m, and the II grade RCC was 6 to 8m wide. All the rest are III grade RCC. The permeability coefficient was less than 10^{-9}.
- Besides normal temperature control measures, mat reinforcement was used in the upstream to prevent cracks. After three winters and two summers, there are still no cracks on the upstream surface.
- Until now, the accumulated concrete poured on the dam is 6.5 million m^3. The world record of annual concrete pouring of 3.18 million m^3, monthly highest concrete pouring of 342,700 m^3 and daily concrete pouring of single silo of 15,816 m^3 are set. The conveyance ability of the belt feeding line sets new record in many times. The maximum daily production of the two feeding lines is 13,050.5 $m^{3.}$ The average production of single line is 326.3 m^3/h. The world records of maximum shift production of 3680 m^3 and monthly concrete conveying of 110,554.5 m^3 for a single feeding line are set.
- The application RCC rapid construction technique on Longtan dam is successful. Power generation of Longtan project is 8 months ahead of time. The high standard of crack free on the RCC surface during construction in changing climates is achieved. The longest single piece of core sample during the RCC core extraction is 15.03m. All mechanical indexes of the finished concrete satisfy the design requirements.

Turnover and cantilever form

Constructed by vibrating rollers

Automatic spraying machine

Laying PVC cooling pipes

Major Technical Achievements and Prizes

Construction Site of Longtan RCC Dam

- The “Research on Key Construction Technologies of Longtan Hydropower Station 200m Grade RCC Gravity Dam” was awarded the Special-class Award in 2007 by Sinohydro Corporation for Scientific and Technological Promotion.
- The “RCC Construction Method” was appraised as provincial construction method of Sichuan Province, and has been declaring national construction method.
- The “Test Method of RCC Construction Field Setting Time” has applied the patent of the State Intellectual Property Office.
- Longtan RCC dam temperature control QC team from Sichuan Ertan International Project Consultation Co., LTD was awarded the prize of National Engineering Construction High Quality Management Team in 2007 which is issued by China Exploration & Design Association.
- The “Research on the High RCC Dam Seepage Control Technique” was awarded the first prize for science and technology promotion by China Hydropower Engineering Consulting Co..
- The “Research on Longtan High RCC Dam Rapid Construction Technique” was awarded the first prize for science and technology promotion by China Hydropower Engineering Consulting Co..
- The “Research on RCC Material Performance and Durability of Corrosion” was awarded the second prize for science and technology promotion by China Electric Power Science and Technology Rewarding Office.

Vibrating of GEV RCC

Pouring RCC with high speed belt feeding line

Technical promotion award applied

- RCC Construction Technique of Longtan Dam under High Temperature and Rainy Condition.
- Temperature Control Technique of Longtan RCC Dam.
- Research on Rapid Evaluating System for Shearing (Twisting) Strength of Layer in Longtan RCC Dam.
- Research on In-situ RCC Layer Setting Control System.
- Sand & Aggregate Production Technique for High Strength RCC in Longtan Dam.
- Longtan RCC Sand & Aggregate Long Distance Rubber Belt Conveying Technique.
- Collision Early Warning System of Large-sized RCC Construction Machinery.
- Development of Microclimate Sprayer used to RCC Silo Surface.

Companies Involved in the Project

The controlling shareholder:	China Datang Corporation
Owner:	Longtan Hydropower Development Co., Ltd.
Designer:	Mid-South Design and Research Institute, CHECC
Prime Contractor:	Joint Venture of Seventh Eighth Bureaus & C.G.G.C (Sinohydro Engineering Bureau 7, Sinohydro Engineering Bureau 8 and China Gezhouba (GROUP) Corporation)
Branch Contractor:	Jiangnan Water Resources and Hydropower Construction Corporation Guangxi Hydroelectric Construction Bureau
Consultant:	Sichuan Ertan International Engineering Consulting Co.，LTD. Zhejiang Huadong Engineering Consulting.CO LTD.

Impounding of Longtan Reservoir