Teesta VI HEP India - Hydraulic model tests for barrage, desanders and power intake

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Introduction and objectives

The future 500 MW Teesta VI HEP with barrage, desanders and power intake is located in Sikkim State in Northern India on the Teesta River (Fig. 1).

Fig. 1: Upstream view of the Teesta River at the future dam site

Hydraulic model tests are carried out in order to establish the viability of the arrangement of barrage, desanders and power intake. A special arrangement of dam and river intake with four desanders on the right bank of the Teesta River has been proposed.

During high Monsoon floods, river bed load and suspended sediments shall be diverted through the spillway openings placed at riverbed level. The various operation modes of the openings of the spillway will be validated. The mentioned works consist of following structures:

- dam with gated spillway
- upstream river intakes on the right bank with four subsequent desanders and
- Power intake arrangement after the desanders for 2 head race tunnels.

Physical model tests

With respect to the objectives of the study, the size of the model and considering the similarity rules and possible scale effects, the physical model has been built at scale of 1:75.

As presented in Fig. 2, the model includes a part of the upstream river section (reservoir), the barrage with the four spillway passages, the river intakes and the four desander basins, power intake and a part of the river downstream.

The maximum discharge for the PMF is 11'600 m^3/s at prototype scale. The design discharge for the HPP is 531 m^3/s divided into two power intakes and headrace tunnels. The first impoundment of the model took place on April 18th, 2008.

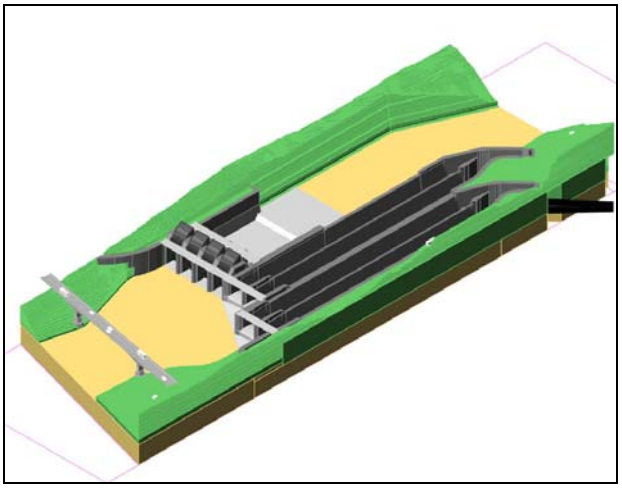

Fig. 2: 3D AutoCad model prepared for the construction of the physical model

All the structures are interdependent and the proper operation of each single unit and their interactions have to be studied, in particular:

- Verification of spillway capacity and rating curve for different scenario of gate opening and sequence of operation
- Verification of approach flow conditions, flow through the spillway, stilling basin and downstream river
- Study of the approach flow in front of the river intake, and of the interactions between the four openings
- Study of the bed load movement for different operation scenarios at Monsoon floods
- Verification of the flow inside the desanders and testing of various flushing devices, operations and techniques
- Assessment of the passage from the desanders to the two power intakes, risk of vortex air entrainment

Fig. 3: Picture of the physical model during first impoundment at the LCH