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Modern Design of Pump-turbines

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Abstract

The increasing interests in the market and the challenging hydraulic requirements call for new developments in the field of pump-turbines. For the Tongbai project ANDRITZ HYDRO has developed a new pump-turbine, applying the modern numerical tools of flow simulation for optimization of all components. Model tests for validation and check of performance completed the development. The unsteady phenomena occurring in pump-turbines like draft tube vortex, turbine synchronization, rotor – stator interaction and pump stability are topics of special research projects which ANDRITZ HYDRO has been following for many years now. A more detailed knowledge and understanding of the phenomena shall help to improve the profile design and to avoid or minimize these unsteady effects. The pumped storage scheme Tongbai is equipped with four pump-turbines with a rated power of 306 MW each. The overall design is presented and several special features of the mechanical design like spiral casing, guide vane bearing and guide vane security device are pointed out. The operational behavior and the first results measured during commissioning are being presented.