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Experience with Large Francis Rehab Projects

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Abstract

Francis turbine rehabilitation and upgrade projects cover a large array of operating conditions and component configurations. Through the years, ANDRITZ HYDRO has had the opportunity to develop adapted hydraulic turbine runners and stationary components modification to enable reach major improvements over the original configurations for many of the largest rehabilitation projects in the world. This expertise is also leveraging the new units design capabilities. Demands from customers and technical challenges are very significant for the large projects thus resulting in significant risks being transferred to the manufacturers.

This paper presents the experience with some of these large projects where such improvements have been designed with CFD support, model tested and implemented on the full scale units, including the 2 different designs for the 10 x 770 MW Guri 2 plant, and the 353 MW Ruacana plant. Also, the Inga 2 case a hydraulic design & performance comparison between the old and rehab units will be provided, as the original design from the former Sulzer-Escher Wyss (now ANDRITZ HYDRO) has recently been upgraded. An outlook to the Inga 3 upcoming project is provided. Through the paper, limiting factors will be discussed, including CFD applications as well as methods for verification of mechanical integrity.