

Francis turbine erosion in a storage hydropower plant

For decades, storage hydropower has been of great importance for the electricity supply in Alpine and adjacent regions. However, large amounts of sediments are transported into hydropower reservoirs and deposited there every year. The sedimentation leads to a loss of storage capacity and compromises the functionality and operational safety of hydropower intakes and outlet works. One strategy to counter reservoir sedimentation is the systematic venting of fine sediments via the power waterway of hydropower plants. The increased fine sediment load yet poses a challenge in terms of hydro-abrasive erosion on the turbines (Fig. 1), reducing their efficiency and leading to lower electricity production. These topics are addressed in a case study at the hydropower plant Langenegg in Vorarlberg, Austria.

The aim of this thesis is to evaluate the turbine operation data in terms of turbine performance, hydraulic losses, load profiles, and discharge. Correlations shall be obtained regarding turbine efficiency and operational states. A visit of the hydropower plant including the installation of measurement equipment is planned. This project offers the opportunity to gain insights into an increasingly important topic based on a real case and to contribute to the efficient use of the hydropower potential.

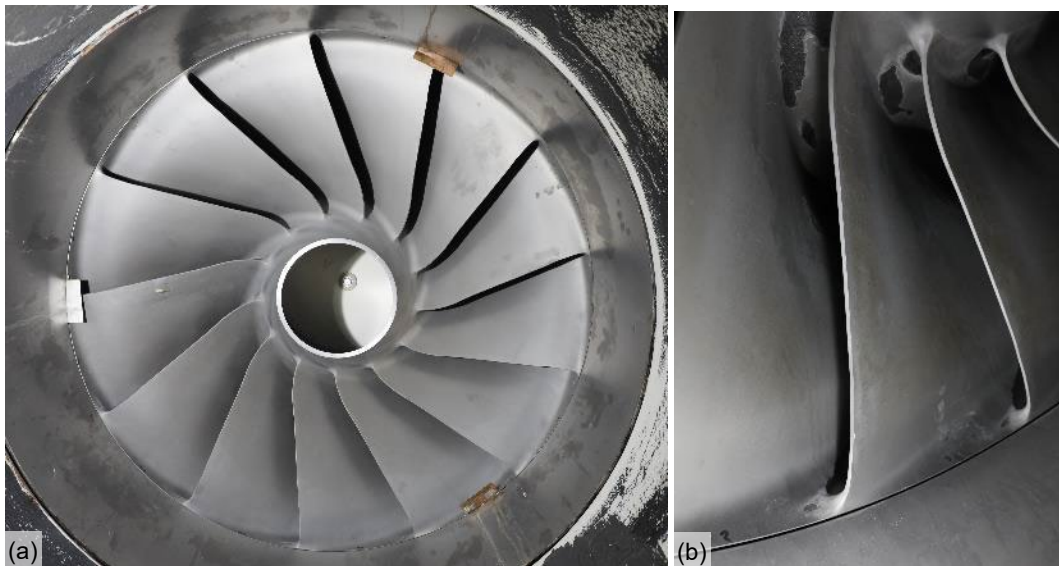


Fig. 1: (a) Francis turbine runner of hydropower plant Langenegg, Austria; (b) first hydro-abrasive erosion traces (Photos: C. Friz)

Contact:

Carolin Friz
Hydraulic Engineering, HIA C 54.2
044/633 63 01, friz@vaw.baug.ethz.ch

Remarks:

up to 2 students for a Bachelor's thesis or Project work; topic can be distributed more than once; report and communication in German or English; visit of the hydropower plant possible