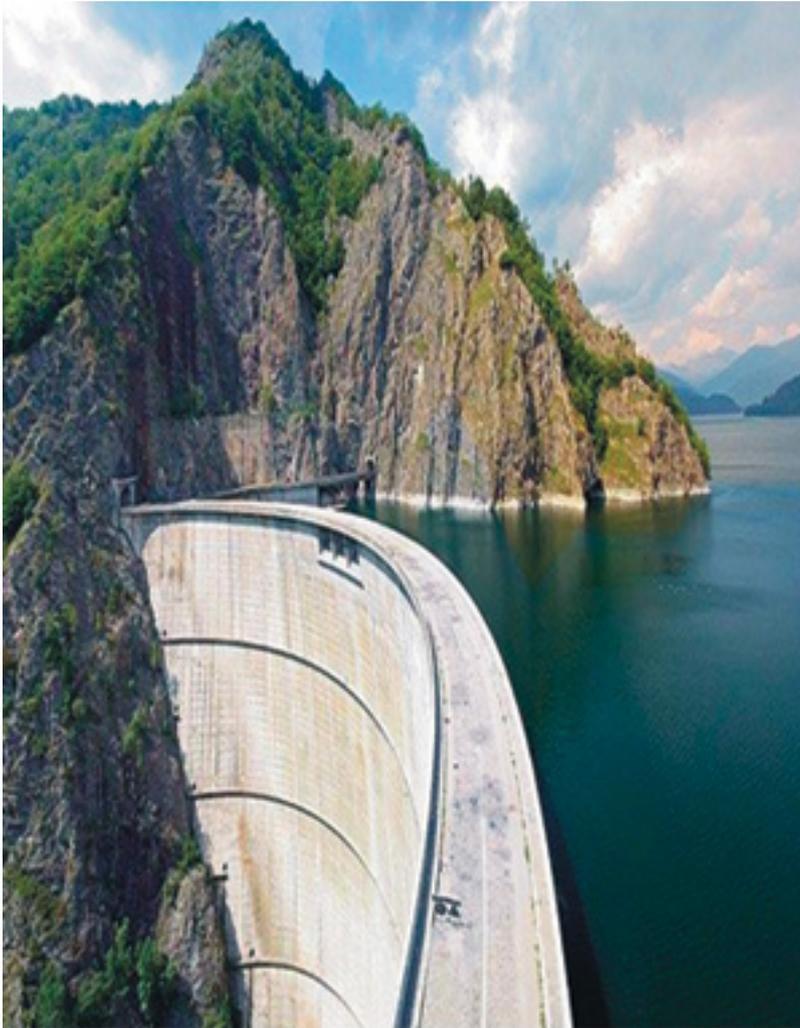


Process Monitoring Of Hydro-Turbine Vibrations

Written by MT Staff
Monday, 11 June 2012 13:08



A portable, expandable, real-time solution increased safety and fault-prediction accuracy and reduced equipment damage for one hydroelectric plant. Could it pay off for you, too?

Management of a hydroelectric facility approached CAS Dataloggers regarding a vibration-monitoring system for the site's turbines and generators. Several parameters were to be monitored, including overall vibration via peak-to-peak displacement, FFT, Smax and shaft orbit, among others. The main objective was to increase safety and fault-prediction accuracy through an easily configurable real-time system. Plant personnel needed to accurately determine the cause of a suspect sound at the generator for a vertical Kaplan hydro turbine—*a sound they believed was due to vibrations at the impeller*

. Management specified that the system be portable (so it could be mounted on different turbines exhibiting electrical or mechanical faults) and modular in design (so it could be expanded to make absolute vibration measurements with piezoelectric accelerometers).

The implementation

The site installed a Delphin TopMessage data acquisition and control system equipped with an

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AMDT module and ProfiSignal Basic software. The system's universal inputs enabled any unit of measurement to be acquired (e.g. temperature, pressure flow, vibration, etc.). Data then underwent direct scaling and linearization. High measurement precision was achieved through the use of 24-bit resolution Sigma Delta converters and enabled the connection of the smallest of signals. A vibration measurement was performed using signal-conditioned proximity transducers mounted on all three of the turbine's journal bearings. Two transducers were mounted on each bearing, with a radial direction, and at an angle of 90 degrees between them. The TopMessage system was mounted within a portable electric panel. ProfiSignal Basic and ProfiSignal Vibro software were used for fault diagnostics. The TopMessage vibration diagnosis indicated a misalignment of the turbine's shaft, but this offsetting had been caused by the instability of the interior radial bearing LRI, presented as increased mechanical looseness inside this bearing in the Y direction. Following the vibration diagnosis, personnel proceeded to check the fixation mode of bearing LRI onto the foundation as well as the bushing state and the mechanical looseness inside the bearing. While checking the bearing LRI, the repair team saw that the nuts used to adjust the journal in the bushing Y direction had been destroyed—
as had the thread on the bolts.

Fulfilling the wish-list and then some

The facility realized several advantages following installation of the Delphin TopMessage system and Profisignal software. The TopMessage system incorporated the required portability and ease of configuration and efficiently transmitted remotely measured data for storage within the TopMessage device or on a PC. As a result of the monitoring safeguards, safety conditions improved (with the aid of ProfiSignal's alarm management software), which helped prevent unnecessary machine damage. The system's modular design gave management the ability to expand it for on-line monitoring of other technical parameters, as well as the ability to connect vibration transducers with a 4-20 mA output

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