Energy

EDF Tignes Malgovert

Two penstocks get wiretapped

EDF has implemented an acoustic emission testing system to monitor the penstocks of the Malgovert power plant. The objective is the real-time detection, for two years and a half, of any failure in the high tensile steel hoops.

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In the Tarentaise Valley, two penstocks built between 1946 and 1953 convey the water from the Tignes dam to the Malgovert power plant located 800 meters below. The bottom sections which withstand the highest pressure (approximately 80 bar), are reinforced with pre-stressed stiff hoops.

But as the hoops are getting old, EDF has decided to start huge replacement work. Philippe Bryla, Expert in mechanical equipment at EDF explains: *"In order to keep the facility in operation, we needed to be able to detect any hoop failure in real time, with the objective of avoiding a second hoop failure from adversely affecting the penstock's pressure resistance".*

On-site simulations

In 2011, Cetim developed a system based on the principle of acoustic emission. Wave propagation tests were first performed on site in order to determine the most suitable sensors and optimise their quantity.

Then, on-site simulations of hoop failures allowed us to check the efficiency of the medium frequency sensors (100 kHz) for the detection of flaws. The background noise generated by the water flowing in the penstocks was also analysed.

Detection and location within 2.5 m

The monitoring system installed is comprised of 20 sensors distributed on the two penstocks, which are 200 m long each. Philippe Bryla continues: *"The system measures the time necessary for the signal generated by the failure of a hoop to arrive and it locates the emitted signal with an accuracy of approximately 2.5 m"*. Therefore, the on-duty technicians are immediately informed of the area where the penstock has to be inspected. After two and a half years of monitoring, the acoustic emission system has proved its efficiency and allowed EDF to continue to produce hydroelectricity whilst still guaranteeing the safety of its facility.

OUR CLIENT

Corporate name
EDF - Hydraulic Engineering Production Division, General Technical Division (DTG)

Activity
DTG provides diagnosis, monitoring and consulting services for hydraulic, nuclear and fossil fuel power plants. DTG contributes to the most important aspects of power plant operation: safety, performance and environment

Workforce
Approximately 650 persons

Cetim's asset

Cetim has more than 30 years of experience in acoustic emission testing and works in many fields of application, especially the monitoring of hydraulic facilities.

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