

MONITORING OF HYDRO TURBINES PREVENTS DAMAGE & SAVES COSTS

At EGEMSA's hydro power plant in Machu Picchu, located beneath the mountain hosting the famous Inca city in Peru, OPENpredictor™ provides online condition monitoring of 3 Pelton hydro turbines of 30 MWA and offline monitoring of auxiliary machinery (water and oil pumps, chillers, fans and air compressors). The plant generates power from the Vilcanota river, which flows down the mountain from 2,130 meter above sea level. To optimize the pressure conditions and power generating potential, the river water is also led through the mountain via a 3.3 km long artificial channel with a considerable height difference of 350 m.

"Thanks to condition monitoring, we no longer have to dismantle the main bearings of our three power generation units for inspection once per year," says engineer Fredy Saavedra Valderrama from EGEMSA in Machu Picchu. "Normally, the inspection takes 14 hours, where we lose a production of



around 1260 MWh. So avoiding downtime for unnecessary inspections saves us approx. USD 31,500 per year plus the time and machine parts spent."

The system has also identified two problems with the alignment of the turbine generator set between the main bearing and the guide turbine bearing. The misalignment was automatically identified and corrected before it became too serious, when the turbine was still operating below vibration alert level, thus minimizing the

risk of rubbing and fatigue development.

The cost of new bearing sets (main and guide bearing) is almost USD 130,000 - and with a delivery time of approx. 5 months, the unit would have to be stopped for minimum 6 months with a considerable economical loss of around USD 3 million for the company.

"Because OPENpredictor™ helped us discover the misalignment problem in due time, we were able to plan

solving the problem during an upcoming scheduled maintenance. If we did not have condition monitoring, the damage of the main bearing or, in the other case, the number of inspections would have to be increased from one to probably two times a year. If the misalignment problem had caused damage to the main bearing, most probably the rotor and the stator would have been damaged with extremely high repair and stand-still costs. In that case the units would be out of the operation for minimum 12 months, resulting in a production loss of USD 6 million per unit," Fredy Saavedra Valderrama concludes.



Engineer Fredy Saavedra Valderrama.



One of the Pelton turbine runners at EGEMSA's hydro power plant in Machu Picchu.