

EFFECTIVELY AVOIDING DOWNTIME THROUGH PERMANENT VIBRATION MONITORING - SOME CASE STUDIES

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ABSTRACT

As a partner of Electrabel for vibration monitoring of its large turbogroups for more than 20 years, Laborelec has been able to gather a vast experience in troubleshooting vibration problems on different machine types. A fast remote analysis of occurring vibrations problems permits us to assist the plant personnel in taking fast actions, avoiding an unavailability of the units, and assuring a more reliable operation. This assistance is certainly valuable when an instable vibration behaviour occurs, since this can give rise to important changes in vibration amplitudes in a very short time.

Some case studies clearly show the added value of a permanent vibration monitoring of turbogroups above the standard vibration protection instrumentation.

In a first case, a very rapid and instable change in shaft vibrations occurred on a 600 MW generator, causing a trip of the unit at full load, just after an overhaul. The problem was quickly identified as an intermittent rub condition, causing important subharmonic vibrations. Experience with rub conditions on a similar unit permitted to correctly indicate the rub location, and to undertake corrective maintenance actions within the day.

A second case treats the instable vibration behaviour of a 1000 MW generator after a stop. Slow variations were encountered in the vibration behaviour, which seemed to stabilize after a certain time, but would reappear slowly afterwards. The behaviour was explained as the result of a rub condition in the hydrogen seal of the generator. The problem was followed up more into detail until the next planned stop of the unit, after which it did not reappear again.

A third example treats a combustion instability in a 150 MW gas turbine. The problem caused important shaft vibrations, but did not trigger the alarming on combustion instability, so it was not recognized immediately as such by the plant personnel. A combination of very cold inlet temperature, the settings of the combustion monitoring and the excitation of a resonance mode of the rotor permitted the experts to explain the behaviour.

Keywords: vibration monitoring, turbine, generator, intermittent rub, Newkirk rub, combustion instability