USING STATISTICAL MODELS IN HYDRO GENERATING UNITS CONDITION MONITORING AND DIAGNOSTICS

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ABSTRACT

Changes in the environment conditions and in the operating state can originate huge variations in the value of a monitored descriptor ("quantity use to describe symptoms which can be either the result of a human observation, or a direct measurement, or that can be derived from processed data"), even when considering steady-state measurements. These variations can be many times greater than the variations originated by real damages in the generating units. Therefore, it is necessary to determine the expected value of a descriptor with a reasonable accuracy, neutralizing the influences of changes in the environmental and operating conditions. Otherwise, the simple checking of the difference between measured and expected values of a descriptor could lead to false-positive or false-negative damage indications.

False damage detection will turn useless the best algorithms for damage diagnosis and damage prognosis. To determine correctly the expected values of the descriptors, on the beginning of structural health monitoring were used mathematical models of the monitored equipment. This practice showed serious difficulties, especially with the validation of the models. Nowadays neural networks and similar techniques are the alternative to the theoretical models.

Based on the results obtained with ITAIPU power plant generating units vibration and temperature monitoring, this paper shows that simplified statistical models can be a good third option to the two above-described alternatives, especially when near-to-real-time decisions are not necessary and evaluations at steady-state conditions are allowed.

Keywords: Monitoring, damage detection, diagnostic, hydrogenerator