

Generator Diagnostic System Using a Web Base Application

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Abstract

A novel integrated diagnostic system has been developed at IREQ, Hydro-Québec's research institute, over the last eight years. Over time, this system will help the utility to make a smooth transition from time-based maintenance to condition-based maintenance of hydro generators. Information technology (Intranet) is used to provide a new, modern and efficient way to produce a continuous classification of the condition of all generators of the fleet along with individual diagnostic of any unit. The system computes actual measurements transferred by plant personnel to a central server. It calculates simple condition indexes for each of six on-line/off-line diagnostic tools and from visual inspection processed as one of the diagnostic tools, and aggregates the results into a comprehensive global diagnostic for each generator. Plant and generator selection is done via a user-friendly interface, displaying simple diagnostic of the results for every tools involved in the diagnostic process. The algorithm underlying the system generates a global diagnostic for any combination of tools, regardless of their number and selection. However, the level of confidence of the diagnostic will increase with the number of tools used in the diagnostic. In addition to the simplified integrated condition index values of all generators and the individual index for each tool, specialists can access and display the complete data for every measurement series. Each tool, was selected based on its ability to characterize specific complementary degradation aspects of the generator. Since the system was developed with an expandable modular approach, it will be possible to add in the future new diagnostic tools, not yet considered in the current version of the application, without affecting the logic of the system. The availability of centralized, simplified information makes it possible for plant engineers, generator specialists and managers alike to assess rapidly, in real time, the condition of any generator and to make decision leading to maintenance optimization. Thus, It becomes possible to schedule additional diagnostic tests when doubts remain on active degradation mechanisms for generators in critical condition or immediately plan effective corrective actions while the generator is still running. At the same time, global efforts in diagnosis and maintenance can be optimized by reducing the number of measurement campaigns for the vast majority of generators of the fleet that are in good condition as revealed by their condition indexes. Hydro-Québec has recently implemented this new system and is already noticing improvement in its maintenance practices.