Virtual Instrumentation and Neural Network Based Monitoring of Power Plant

N.S.Vyas
Professor
Department of Mechanical Engineering
Indian Institute of Technology
Kanpur

Ankur Kumar
Graduate Student
Department of Mechanical Engineering
Indian Institute of Technology
Kanpur

Abstract

Health of rotating machinery like turbines, generators, pumps, fans etc. is crucial to reliability in power generation. Problems like unbalance, misalignment, bearing damage, casing and foundation distortion, bearing looseness, rotor cracks, rubs etc commonly occur in rotating machinery. The paper describes the development of an instrumentation system for condition monitoring of a 210 MW Thermal Power Unit. The instrumentation system incorporates (i) data acquisition, (ii) signal processing and (iii) diagnosis through comparison of signal parameters in a knowledge system. Data is acquired over 21 channels simultaneously from various locations along the unit. Apart from vibration these signals include information on power generated, frequency, temperature and pressure. Virtual Instrumentation is developed in LabVIEW and integrated with the sensors. Diagnosis is based on a neural network algorithm which is developed in MATLAB. Salient features of the overall system include – on-line data-acquisition and display over 21-channels; frequency analysis and real-time FFT display; mean value computations; on-line trending analysis and display for the previous 24-hours; automatic data logging after every 24-hours with date-time information; safe, tolerable and alarm level information for all channels; visual and audio alarm activation in case of limit crossing at any of the 21-channels and fault identification.