RESOLVING HIGH VIBRATIONS OF SHIPBORNE AC PLANT USING OMA ODS ANALYSIS

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Cmde Talwelkar has thirty five years of service in the Indian Navy. He has served onboard destroyer, missile corvette, missile boat and a seaward defence boat. He has the experience of serving at Naval Headquarters as Joint Director at Directorate of Marine Engineering and as Director (Information Technology). He has served as Command Engineer Officer at Eastern Naval Command. There are many achievements to his credit during his tenure as Deputy General Manager (Production) at Naval Dockyard Visakhapatnam. He has been associated with the ATV programme and has looked after construction of strategic submarines. He is presently posted as Director General Naval Trials and Acceptance Authority and has been responsible for management of underwater radiated noise, implementation of Condition Based Predictive Maintenance Philosophy as well as acceptance of new acquisition ships and ships under refit.

Captain Jasvir Singh graduated from the Naval College of Engineering. Lonavala in 1995 and completed Post graduation in the field of Industrial Tribology from IIT Chennai in 2003. He was awarded the Gold Medal for Outstanding Academic Record and also Best Project in the field of Artificial Neural Networks during his MTech Course. The author has served onboard Indian Naval Ship Shakti as REO as well as commissioning EO and other frontline ships namely, Godavari, Ajay and Brahmaputra. The officer has served at INS Shivaji as Senior Instructor EPCT School, as Deputy OIC at MTU, Mumbai and in Naval Dockyard, Mumbai as Deputy Manager Systems and DGM(IRC). The officer was posted as Deputy General Manager (Planning) at NSRY (Karwar). He has presented two papers at National Convention of Marine Engineers and National Convention of Maintenance Engineers. The officer has presented various papers in the Indian Naval symposia and seminars. The officer has been commended by the Chief of Naval Staff on two occasions and by the FOCinC. The officer is presently serving at Machinery Trials Unit, Mumbai as Joint Officer in-Charge

Abstract

Recurring issue of high vibrations were observed on AC plant of a ship. As part of the analysis, it was observed that broadband vibration trends of these AC plants of ships of similar class were high. Advanced techniques like Operational Modal Analysis (OMA) and Operation Deflection Shapes (ODS) analysis techniques were used to study the equipment foundation. The study was aimed at identifying the various mode shapes, associated natural frequencies and foundation behavior whilst the equipment was in operation. The same was then utilized to establish and resolve the root cause of high vibrations of these plants. The OMA results indicated that forcing frequencies generated by the equipment were coinciding with the equipment foundation. Besides, improper alignment tolerances and absence of dowel pin / fit bolts arrangements was leading to inception of dynamic misalignment. Based on the study, foundation strengthening followed by alignment was undertaken and equipment performance was found to be satisfactory. Further, Finite Element Analysis was used to corroborate the findings of the OMA / ODS study. In addition, the foundation strengthening results were revalidated by repeat OMA / ODS analysis.