

Shipboard Condition Based Maintenance and Integrated Power System Initiatives

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Beginning in 1999, the Department of Defense (DoD) has mandated that all military divisions develop and implement methods to reduce total ownership costs (R-TOC) of force structure and readiness. The R-TOC program was established in response to longstanding concerns about the adverse impact of defense budgetary and operational trends on force structure and readiness. Declining procurement funds are resulting in a rapidly aging and potentially inefficient and unsupportable inventory. Rising operations and support (O&S) costs consume higher portions of defense budget and leave even less available for modernization. This thesis was used to evaluate the potential for cost savings on two fronts, maintenance and fuel.

A potential cost savings could be had through the implementation of condition based maintenance (CBM), the process of conducting maintenance based on the equipment's condition vice a predetermined periodicity based on previous experience. To support this cost saving initiative, a method for electrical-based condition monitoring using shaft speed oscillation was explored to assess the health of an electrical load. Experiments involved rigorous testing in the laboratory environment as well as shipboard testing aboard the US Coast Guard Cutter Escanaba (WMEC-907).

In addition to the exploration of CBM techniques, concepts that could potentially improve fuel economy were investigated. For this evaluation a test platform was constructed to allow for the testing of revolutionary methods of generating propulsion from an integrated power system.

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