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16. Abstract (MAXIMUM 200 WORDS)

An examination of technical and procedural approaches to reducing energy usage and cost was performed to determine applicability to U.S. Coast Guard (USCG) boats and small cutters. A detailed cost-benefit analysis was conducted for those approaches deemed feasible for possible retrofit. Payback period and annual fuel savings were calculated to provide guidance to the USCG regarding which approaches should be pursued for incorporation in the fleet.

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Executive Summary

Rising energy costs have created a budget crisis within the United States Coast Guard. Non-essential operations, including vessel training, have been curtailed because fuel has become so expensive. Reducing energy consumption has become a high priority for the entire fleet. In response to this problem, the Coast Guard R&D Center tasked the Naval Surface Warfare Center, Carderock Division, Detachment Norfolk, Combatant Craft Department (CCD) to examine the application of energy saving technical and procedural approaches to boats and small cutters. The program consisted of three distinct tasks.

Task 1 identified the energy usage on a platform, system, and component level based on operating profiles, hours of operation per year, systems installed, and operator surveys. A Total Yearly Fuel Consumption Value (TYFCV) was calculated for each boat and cutter type to accurately determine which platforms would benefit from the applications and ultimately save the United States Coast Guard (USCG) the most energy. This analysis proved that the 110' WPB, 87' WPB, 47' MLB, 41' UTB, and Rigid Inflatable Boat (RIB) classes accounted for almost 90 percent of the fuel consumed by boats and single cutters and represent the largest [projected] fuel consumers in the boat and small cutter realm.

Task 2 examined technical and procedural approaches that could reduce energy usage and fuel costs aboard the 110' WPB, 87' WPB, 47' MLB, 41' UTB, and RIB classes. Included in the examination was a preliminary Rough Order of Magnitude (ROM) cost-benefit analysis detailing annual fuel savings and a period of payback. Based on the preliminary ROM analysis, stern flaps, advanced tip propellers, four-stroke outboards, waste oil disposal systems, and fuel additives yielded the highest potential savings and therefore were selected for a more comprehensive examination in the final task.

Task 3 selected approaches were subjected to a more detailed cost-benefit analysis, which considered interest rates, sensitivity, and more accurately accounted for development and installation costs. The analysis concluded that implementing four-stroke outboards in place of two-stroke outboards to propel the RIBs would provide a significant and almost immediate fuel savings. Although providing enhanced capabilities, in the form of increased patrol speed and increased maximum speed, integrating stern flaps aboard the 87' WPB will not decrease fuel consumption. The installation of advanced tip propellers on 87' WPBs is not a viable fuel-saving approach because the payback period for the investment is much too long. Finally, the study recommends that the USCG not consider waste oil disposal systems and fuel additives until sufficient, credible research is conducted.

This study evaluated the applicability and potential fuel saving of current technologies on the present USCG boat and small cutter fleet. To reduce fuel costs in future craft, fuel efficiency must be made a primary requirement and considered as a desirable feature to reduce total ownership cost when evaluating proposed designs. The value of engineering dollars spent up-front to reduce fuel consumption should be considered in light of the life-cycle savings that could be gained.