ROOT CAUSE FAILURE ANALYSIS OF PROPELLER SHAFTS IN FAST GUN BOATS IN SRI LANKA NAVY

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Degree of Master of Science

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Declaration

I declare that this is my own work and this thesis/dissertation does not incorporate without acknowledgement any material previously submitted for a degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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The above candidate has carried out research for the Masters Dissertation under our supervision.

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Abstract

The Fast Gun Boats are playing a vital role for Sri Lankan naval fleet to prevent anti-smuggling and poaching activities in the northern seas at present. The aim of this research is focused on identify the failure of propeller shafts in fast gun boats and to find out the root causes for such failures. These crafts operated last four decades and failure of propeller shafts has been identified. Failure of propeller shafts is a critical situation concerning not only the operational requirements of the Sri Lanka Navy but also the repair cost & time. The objective of this research is to develop a mechanism to identify and analyze the root causes for failure of propeller shafts. This objective can be accomplished by examining the failed propeller shafts and investigating the fracture surfaces of propeller shafts to identify the root cause and propose recommendations to investigate the design of the propeller shafts and find solutions to overcome those failures. The initial findings which were mainly based on past records of failure, the operating running hours of propeller shafts and the pattern failure of propeller shafts was analyzed by Scanning Electron Microscope (SEM).

According to the findings, the corrosion on shaft surface (pitting) causes the failure of propeller shafts. The experimental investigation highlighted that corrosion penetrates for further depth at the bottom of the corroded layer. Further, stress raisers were initiated from the bottom of the corroded layer and corrosion penetrates through stress raises. After further investigation, it was confirmed that oxygen is available inside the stress raisers. Therefore, oxygen actively participated in increasing the corrosion. The results of the experiment provide a better understanding of the corrosion in propeller shafts. Further, it was highlighted that the corrosion adjacent to the edge of the shaft is severe as galvanic corrosion. Thereby, the design itself promotes the failure at propeller shafts and this study was able to prove the same for future studies.

Keywords: Fast Gun Boats, Propeller shafts, Scanning Electron Microscope

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LIST OF ABBREVIATIONS

Abbreviation	Description
ASME:	American Society of Mechanical Engineers
EDS:	Energy Dispersive Spectroscopy
EDXA:	Energy Dispersive X Ray Analysis
FGB:	Fast Gun Boat
NDT:	Non-Destructive Testing
OEM:	Original Equipment Manufacturer
SEM:	Scanning Electron Microscope
SLNS:	Sri Lanka Naval Ship