IMPROVEMENT OF DEUTZ MARINE ENGINES TO REDUCE CYLINDER LINER FAILURE DURING TRANSIENT CONDITIONS

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Degree of Master of Engineering

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Thesis submitted in partial fulfilment of the requirements for the
Degree of Master of Engineering in Manufacturing Systems Engineering

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ABSTRACT

The problem of cylinder liner seizure of marine engines fitted on-board Fast Attack Craft (FAC) is an outstanding issue in Sri Lanka Navy(SLN).This failure has resulted in the wastage of money, manpower, reliability and non-operation of craft fitted with these engines. The Original Equipment Manufacturer (OEM) has tried to solve this issue by extensive investigations. However, the problem has not been fully resolved.

The research is mainly focused on geometrical aspects, surface texture, parameters of cylinder liner and low load running as these are the most influential factors for a cylinder liner. The parameters of the engine were investigated experimentally by preparing an experimented cylinder liner and installing it on 04 engines, surface texture and geometry of cylinder liners were inspected by obtaining sample cylinder liners from stock, and Low Load Running was examined on 04 Nos. engines for 06 months duration.

Literature survey revealed that most of the researches are related to thermal cracking, excessive wear down and lubrication oil failure, however, less attention has been paid towards the cooling water system of the engine. Therefore, engines were operated in steady state condition and also in various transient load conditions with experimented cylinder liners to understand the behaviour of the coolant system and related parameters.

It was revealed that the coolant system of the engine is not responding properly to cater to transient load changes of the engine and as a result, the cooling water temperature as well as the cylinder liner wall temperature could not achieve the required temperature to maintain sufficient clearance between piston and cylinder liner, thus causing a risk of cylinder liner seizure. Hence, a more sensitive thermostatic control valve can be introduced, which can respond very quickly in order to maintain specified elevated temperature values of the engine.

The research is structured in 06 main chapters: (1) Introduction, referring to content, aim & objective, methodology (2) Literature Review, addressing the theoretical background of the problem (3) Results, complete analysis of the thesis (4) Conclusion (5) Recommendation and (6) Future Work, referring to limitations and proposals for future research.

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OEM – Original Equipment Manufacture

SLN – Sri Lanka Navy