Optimization of the Performances of P 47 Series Fast Attack Craft in Sri Lanka Navy Using AI-Driven Hydrodynamics Analysis

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The P 47 series Fast Attack Craft (FAC) of the Sri Lanka Navy has been designed to achieve a design speed of 40 knots. Presently, the P 47 series consists of 05 No's of FACs namely P 471, P 472, P 473, P 474 and P475 which have the capability of reaching the maximum speed of 40 knots during post-slipping trials on completion of Routine Under Water Maintenance (RUWM) or Hull Cleaning design. However, after one to two months of operation, the maximum achievable speed of the craft is reduced to 25 – 28 knots gradually. This significant performance drop of P 47 series FAC has affected its speed, acceleration, and manoeuvrability. Consequently, this reduction compromises the operational efficacy of the vessels and creates considerable barriers to naval operations. Therefore, this study aimed to investigate the primary causes of these problems and also to propose suitable solutions. A comprehensive analysis using NavCad software and Savitsky method was employed to simulate/model the craft's hydrodynamic behaviour under various load conditions with LCG shifts and adjustments to weight distribution and experimental trials were carried out to validate the theoretical models. This investigation provides empirical evidence and practical solutions for a long-lasting issue of performance reduction in P 47 series FAC in the Sri Lanka Navy while filling the gap of available literature. The research findings enhance the understanding of planning hull dynamics while providing actionable insights for naval architects, engineers and decision-makers. Further, this study provides directions to explore further optimization techniques and real-world applications in future

Keywords: *performance drop, fast attack craft, hydrodynamic analysis, planning hull*