

MODIFIKASI SISTEM PROPULSI *DIESEL-ELECTRIC* *HYBRID* PADA KAPAL NELAYAN 1 GT

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ABSTRAK

Kapal nelayan 1 GT umumnya masih menggunakan sistem propulsi diesel konvensional sehingga kurang efisien saat beroperasi pada kecepatan rendah, seperti penebaran dan penarikan jaring. Penelitian ini bertujuan melakukan modifikasi sistem propulsi kapal nelayan 1 GT dengan menerapkan konsep *diesel-electric hybrid* serta merealisasikannya dalam bentuk *prototype*. Metode penelitian meliputi observasi lapangan, *redrawing* kapal, analisis tahanan, perancangan sistem propulsi *diesel-electric hybrid*, pembuatan *prototype*, dan pengujian fungsional.

Hasil penelitian menunjukkan bahwa sistem propulsi *parallel diesel-electric hybrid* berhasil dirancang dan direalisasikan menggunakan mesin rumput sebagai representasi mesin diesel dan motor BLDC sebagai penggerak listrik. *Prototype* menggunakan konfigurasi dua poros (*twin shaft*) dan dua *propeller* (*twin propeller*) sebagai penyesuaian skala *prototype*. Hasil pengujian menunjukkan bahwa sistem propulsi dan sistem kendali berfungsi dengan baik, meskipun terdapat kendala pada sambungan poros *propeller* akibat getaran mesin. Secara keseluruhan, *prototype* mampu merepresentasikan konsep sistem propulsi *diesel-electric hybrid* sebagai media demonstrasi dan pembelajaran.

Kata kunci: kapal nelayan 1 GT, *diesel-electric hybrid*, *prototype*, *twin shaft*.

ABSTRACT

A 1 GT fishing vessel generally uses a conventional diesel propulsion system for all operating conditions, resulting in low fuel efficiency during low-speed operations such as net setting and hauling. This study aims to modify the propulsion system of a 1 GT fishing vessel by applying a diesel–electric hybrid concept and implementing it in the form of a prototype. The research methods included field observation, vessel redrawing, resistance analysis, diesel–electric hybrid propulsion system design, prototype construction, and functional testing.

The results show that the parallel diesel–electric hybrid propulsion system was successfully designed and realized using a brush cutter engine as a representation of the diesel engine and a BLDC motor as the electric propulsion source. The prototype adopted a twin-shaft and twin-propeller configuration as an adjustment to the prototype scale. Functional testing showed that the propulsion and control systems operated properly, although a minor problem occurred in the propeller shaft connection due to engine vibration. Overall, the prototype successfully demonstrated the implementation of a diesel–electric hybrid propulsion system as a learning and demonstration model.

Keywords: *1 GT fishing vessel, diesel–electric hybrid, prototype, twin shaft.*