

TUGAS AKHIR

PERANCANGAN KAPAL NELAYAN DI PERAIRAN LAUT KABUPATEN PESISIR SELATAN

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ABSTRACT

Pesisir Selatan Regency is a coastal region with 16,690 residents working as fishermen. However, the ship design and construction process in this region is still carried out using traditional methods without technical calculations, resulting in vessels that are not yet efficient and whose compliance with standards is unknown. This study aims to design a fishing vessel that complies with the standards of the Biro Klasifikasi Indonesia (BKI) and the stability criteria of the (IMO) and comparing it with existing vessel.

Using the parent design approach, the vessel's principal dimensions were determined through linear regression analysis. The total vessel weight consists of a Light Weight Tonnage (LWT) of 13.2 tons and a Deadweight Tonnage (DWT) of 10.5 tons. Resistance analysis using the Holtrop method resulted in a resistance force of 2.71 kN at the operational speed of 7 knots, with a required engine power of 14.38 kW. Accordingly, a Yanmar 3YM20 engine with an output of 15.3 kW was selected. The vessel's design includes a body plan, sheer plan, half-breadth plan, and a general arrangement incorporating the cargo hold, engine room, and freshwater tank.

The wooden hull structure complies with BKI, frame spacing of 350 mm, an outer hull plank thickness of 36 mm, and frame dimensions of 90 × 140 mm. The hull materials consist of Lagan and Laban wood. The engine room design includes an engine foundation with an 8 × 125 mm top plate and 5.5 mm longitudinal girders. Fire protection is provided using calcium silicate boards and while the exhaust pipe is insulated with 60 mm thick rock wool.

Stability tests were conducted under three loading conditions, and the vessel satisfied all applicable stability criteria in each case. The proposed design is proven to be safe, efficient, and suitable as a technical reference for the construction of wooden fishing vessels in Pesisir Selatan Regency. The design process successfully produced a vessel with structural integrity and stability that comply with the applicable standards. However, the engine room design has not yet fully complied with BKI requirements.

Keywords: Ship Design, fishing vessel, Biro Klasifikasi Indonesia (BKI), International Maritime Organization (IMO), Pesisir Selatan Regency.

ABSTRAK

Kabupaten Pesisir Selatan merupakan wilayah dengan 16.690 penduduk yang berprofesi sebagai nelayan. Namun, proses rancang bangun kapal di wilayah ini masih dilakukan secara tradisional tanpa perhitungan teknis, sehingga menghasilkan kapal yang belum efisien dan belum diketahui apakah sesuai dengan standar. Penelitian ini bertujuan merancang kapal nelayan yang memenuhi standar Biro Klasifikasi Indonesia (BKI) dan kriteria stabilitas *International Maritime Organization* (IMO), dan membandingkan dengan kapal *existing*.

Hasil perancangan dengan metode *parent design approach* menghasilkan ukuran utama kapal melalui regresi linear. Berat total kapal terdiri dari LWT sebesar 13,2 ton dan DWT sebesar 10,5 ton. Analisis hambatan menggunakan metode Holtrop menghasilkan gaya resistansi sebesar 2,71 kN pada kecepatan operasional 7 knot dengan kebutuhan daya mesin sebesar 14,38 kW, sehingga dipilih mesin *Yanmar 3YM20* berdaya 15,3 kW. Desain *lines plan* kapal mencakup *body plan*, *sheer plan*, dan *half breadth plan*, serta *general arrangement* yang terdapat ruang muat, ruang mesin, dan tangki air tawar.

Konstruksi lambung kayu mengikuti regulasi BKI dengan jarak antar gading 350 mm, tebal kulit luar 36 mm, dan profil penampang gading 90×140 mm. Material lambung menggunakan kayu *Lagan* dan *Laban*. Perancangan ruang mesin mencakup pondasi mesin berukuran pelat atas 8×125 mm dengan pemikul membujur 5,5 mm, proteksi kebakaran menggunakan papan kalsium silikat dan insulasi pipa gas buang dengan *rock wool* setebal 6 cm.

Pengujian stabilitas dilakukan pada tiga kondisi muatan dan semuanya dinyatakan lulus terhadap seluruh kriteria stabilitas. Rancangan ini terbukti aman, efisien, dan layak dijadikan acuan teknis dalam pembangunan kapal nelayan kayu di Kabupaten Pesisir Selatan. Setelah melakukan perancangan sesuai standar, didapatkan konstruksi, dan stabilitas kapal *existing* sesuai standar. Namun, ruang mesin belum memenuhi standar BKI.

Kata kunci: Perancangan kapal, kapal nelayan, Biro Klasifikasi Indonesia (BKI), *International Maritime Organization* (IMO), Kabupaten Pesisir Selatan.