

ABSTRAK

DESAIN KAPAL PENGANGKUT TANDAN BUAH SEGAR KELAPA SAWIT BERKAPASITAS 3,5 TON DENGAN SISTEM KONVEYOR DI SUNGAI KAMPAR KIRI TENGAH

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Transportasi Tandan Buah Segar (TBS) kelapa sawit di Desa Simalinyang, Kecamatan Kampar Kiri Tengah, Kabupaten Kampar masih menggunakan perahu motor berkapasitas kurang dari 2,5 ton sehingga memerlukan beberapa kali perjalanan dan menyebabkan proses distribusi menjadi kurang efisien. Penelitian ini bertujuan merancang kapal angkutan TBS yang sesuai dengan karakteristik Sungai Kampar Kiri Tengah sehingga mampu meningkatkan kapasitas angkut, efisiensi operasional, dan keselamatan pelayaran. Metode yang digunakan meliputi survei lapangan, studi literatur, analisis kebutuhan kapasitas angkut, penentuan ukuran utama menggunakan metode regresi linier berdasarkan kapal pembanding, pemodelan tiga dimensi menggunakan *Maxsurf* Modeler, serta analisis hidrostatik, stabilitas, dan kebutuhan daya penggerak menggunakan perangkat lunak *Maxsurf*. Hasil penelitian menunjukkan bahwa kapasitas angkut optimum yang dibutuhkan adalah 3,5 ton per perjalanan. Berdasarkan hasil regresi dan proses iterasi diperoleh ukuran utama kapal yaitu panjang keseluruhan (LOA) 9,10 m, LPP 8,9 m, lebar (B) 2,50 m, tinggi (H) 1,40 m, dan sarat (T) 0,45 m. Hasil analisis hidrostatik menunjukkan kapal memiliki daya apung yang memadai, sedangkan analisis stabilitas memenuhi kriteria IMO Intact Stability Code (MSC.267(85)) sehingga kapal dinyatakan aman pada kondisi pembebanan yang direncanakan. Analisis hambatan dan daya menunjukkan kebutuhan daya penggerak sebesar 53 HP untuk mencapai kecepatan operasi 7 *knot*. Dengan demikian, desain kapal yang dihasilkan dinilai layak digunakan sebagai sarana transportasi TBS di Sungai Kampar Kiri Tengah karena mampu meningkatkan kapasitas angkut, efisiensi distribusi, serta mendukung keselamatan operasional.

Kata Kunci : kapal angkutan TBS, Sungai Kampar Kiri Tengah, regresi linier, stabilitas kapal, *Maxsurf*.

ABSTRACT

DESIGN OF AN OIL PALM FRESH FRUIT BUNCH (FFB) TRANSPORT VESSEL TO SUPPORT THE MOBILITY OF FRESH FRUIT BUNCHES ON THE KAMPAR KIRI TENGAH RIVER

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The transportation of Fresh Fruit Bunches (FFB) of oil palm in Simalinyang Village, Kampar Kiri Tengah District, Kampar Regency is currently carried out using small motorized boats with capacities below 2.5 tons, requiring multiple trips and reducing transportation efficiency. This study aims to design an FFB transport vessel suitable for the operating conditions of the Kampar Kiri Tengah River to improve carrying capacity, operational efficiency, and navigational safety. The research methods included field surveys, literature review, transportation capacity analysis, determination of the principal dimensions using a linear regression approach based on comparable vessels, three-dimensional modeling with Maxsurf Modeler, and hydrostatic, stability, and propulsion power analyses using Maxsurf software. The results indicate that the required payload capacity is 3.5 tons per trip. The final principal dimensions obtained through regression and design iteration are 9.10 m length overall (LOA), 2.50 m LPP, 8.9 m, breadth (B), 1.40 m depth (H), and 0.45 m draft (T). Hydrostatic analysis confirmed adequate buoyancy, while stability analysis satisfied the IMO Intact Stability Code (MSC.267(85)) requirements, indicating that the vessel is safe under the planned loading conditions. Resistance and propulsion analysis showed that an engine power of 53 HP is required to achieve the service speed of 7 knots. Therefore, the proposed vessel design is considered feasible for transporting oil palm FFB on the Kampar Kiri Tengah River by increasing payload capacity, improving transportation efficiency, and supporting safe vessel operations.

Keywords: oil palm fresh fruit bunches, river transport vessel, linear regression, ship stability, Maxsurf.