ANALISIS KEKUATAN MATERIAL PADA KOMPOSIT FIBER GLASS DENGAN VARIASI ARAH SERAT KARBON DAN LANTOR SORIC XF PADA ZONA LAMBUNG KAPAL FIBER

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ABSTRAK

Studi ini bertujuan untuk menganalisis dampak variasi orientasi serat karbon (0°, 30°, dan 45°) serta penerapan Lantor Soric XF sebagai bahan inti terhadap daya tarik komposit *fiberglass*–epoxy dalam aplikasi zona lambung kapal. Spesimen dibuat dengan metode hand lay-up dan diuji memakai *Universal Testing Machine* (UTM) mengikuti standar ISO 527. Hasil pengujian menunjukkan bahwa orientasi serat 0° memberikan kinerja terbaik dengan nilai tegangan tarik tertinggi rata-rata sekitar ±80–85 MPa, tegangan luluh ±60 MPa, serta modulus elastisitas tertinggi sekitar 1130 MPa, sedangkan orientasi 30° dan 45° mengalami penurunan kekuatan karena penyimpangan arah serat terhadap beban. Penambahan Lantor Soric XF terbukti mempertebal struktur tanpa menambah bobot yang signifikan dan mampu menjaga distribusi tegangan antar lapisan, yang mendukung kinerja komposit sandwich pada struktur badan kapal. Temuan ini menegaskan bahwa pilihan orientasi serat yang sesuai adalah elemen penting dalam merancang komposit berkinerja tinggi untuk penggunaan maritim.

Kata kunci: komposit, *fiber glass*, orientasi serat, lambung kapal

ANALYSIS OF MATERIAL STRENGTH OF FIBERGLASS COMPOSITES WITH VARIATIONS IN CARBON FIBER ORIENTATION AND LANTOR SORIC XF IN FIBERGLASS SHIP HULL ZONES

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ABSTRACT

This research aims to analyze the effect of carbon fiber orientation (0°, 30°, and 45°) and the application of Lantor Soric XF as a core material on the tensile strength of fiberglass–epoxy composites for ship hull applications. Specimens were manufactured using the hand lay-up method and tested with a Universal Testing Machine (UTM) following ISO 527 standards. The results show that the 0° fiber orientation provides the highest mechanical performance, with an average ultimate tensile strength of approximately 80–85 MPa, yield strength of about 60 MPa, and the highest modulus of elasticity of around 1130 MPa. Meanwhile, the 30° and 45° orientations exhibited reduced strength due to misalignment between fiber direction and loading. The addition of Lantor Soric XF effectively increased structural thickness without significant weight gain and enhanced stress distribution between laminate layers, supporting the performance of sandwich composites in ship hull structures. These findings highlight that selecting the proper fiber orientation is crucial for designing high-performance composite materials for maritime applications.

Keywords: *composite, fiberglass, fiber orientation, ship hull*