

**PERBANDINGAN KEKUATAN TARIK KOMPOSIT
FIBERGLASS BARU DAN *FIBERGLASS* HASIL
PEMBAKARAN SEBAGAI BAHAN PENGUAT KOMPOSIT**

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ABSTRAK

Limbah serat kaca fiberglass dari industri perkapalan yang terus menumpuk berpotensi mencemari lingkungan sekitar jika tidak dikelola dengan benar. Penelitian ini bertujuan untuk membandingkan kekuatan tarik komposit yang menggunakan serat fiberglass baru dengan serat fiberglass daur ulang hasil pembakaran suhu 480–500 °C. Metode pembuatan spesimen uji dalam penelitian ini menggunakan teknik laminasi manual (hand lay-up) dengan susunan berupa 6 lapis Chopped Strand Mat (CSM) dan 5 lapis Woven Roving (WR) dengan matriks resin poliester. Spesimen uji dipotong menjadi masing-masing 4 sampel berdasarkan standar ASTM D638 Tipe I. Pengujian mekanik dilakukan menggunakan mesin Universal Testing Machine (UTM) untuk mengetahui nilai kekuatan tarik maksimum (Ultimate Tensile Strength) serta nilai regangan material tersebut. Hasil pengujian menunjukkan bahwa komposit serat fiberglass baru memiliki rata-rata kekuatan tarik maksimum sebesar 224,38 MPa dengan regangan rata-rata 4,48%. Sementara itu, komposit serat fiberglass hasil pembakaran mengalami penurunan sifat mekanik dengan rata-rata kekuatan tarik maksimum sebesar 121,12 MPa. Penurunan kekuatan tarik disebabkan oleh degradasi ikatan pada antarmuka serat dan matriks akibat paparan suhu tinggi saat pembakaran. Meskipun demikian, kekuatan tarik serat daur ulang tetap melampaui nilai minimal penelitian sebesar 98 MPa. Kesimpulannya, material serat daur ulang ini layak direkomendasikan untuk diaplikasikan kembali pada komponen nonstruktural ringan di industri perkapalan.

Kata kunci: Komposit, Fiberglass, Daur Ulang Termal, Uji Tarik, ASTM D638 Tipe I.

**COMPARISON OF TENSILE STRENGTH BETWEEN NEW FIBERGLASS
AND FIBERGLASS DERIVED FROM COMBUSTION AS COMPOSITE
REINFORCEMENT MATERIAL**

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ABSTRACT

The continuous accumulation of fiberglass waste from the shipbuilding industry poses a significant risk of environmental pollution if not managed properly. This study aims to compare the tensile strength of composites made from new fiberglass with those utilizing recycled fiberglass obtained through thermal processing at 480–500 °C. The specimens were fabricated using the manual laminating technique (hand lay-up), consisting of 6 layers of Chopped Strand Mat (CSM) and 5 layers of Woven Roving (WR) within a polyester resin matrix. The test specimens were then cut into 4 samples for each variation in accordance with the ASTM D638 Type I standard. Mechanical testing was conducted using a Universal Testing Machine (UTM) to determine the ultimate tensile strength and elongation behavior of the materials. The test results indicated that the new fiberglass composite achieved an average ultimate tensile strength of 224.38 MPa with an average strain of 4.48%. Conversely, the recycled fiberglass composite experienced a decline in mechanical properties, yielding an average ultimate tensile strength of 121.12 MPa. This reduction in tensile strength was caused by the degradation of the fiber–matrix interface bond due to high-temperature exposure during combustion. Nevertheless, the tensile strength of the recycled fiber still exceeded the minimum research reference value of 98 MPa. In conclusion, this recycled material remains highly viable and recommended for reapplication in lightweight non-structural components within the shipbuilding industry.

Keywords: Composite, Fiberglass, Thermal Recycling, Tensile Test, ASTM D638 Type I.