

ANALISIS VARIASI ARAH SERAT DAN FRAKSI VOLUME SERAT SABUT KELAPA TERHADAP KEKUATAN TARIK DAN KEKUATAN IMPAK

Muhammad Gilang Baihaqi

ABSTRAK

Penelitian ini dilakukan untuk melihat seberapa besar pengaruh arah serat dan fraksi volume serat sabut kelapa terhadap kekuatan tarik dan dampak komposit berbasis resin polyester. Serat yang digunakan diatur dalam tiga arah, yaitu horizontal, vertikal, dan acak, serta divariasikan fraksi volumenya menjadi 10%, 15%, dan 20%. Sebelum diproses, serat diberi perlakuan NaOH 5% selama dua jam, kemudian dibuat menjadi komposit menggunakan metode hand lay-up. Pengujian tarik dan dampak dilakukan mengacu pada standar ASTM D638 dan ISO 179-1. Dari hasil pengujian, orientasi horizontal dengan fraksi volume 15% menunjukkan performa paling baik, ditandai dengan nilai kekuatan tarik 19,45 MPa dan nilai dampak 0,1583 J/mm². Sebaliknya, nilai terendah ditemukan pada susunan vertikal dengan fraksi serat 10%. Secara keseluruhan, komposit berbasis serat sabut kelapa memiliki potensi yang baik terutama dalam menahan beban benturan, sehingga berpeluang untuk dikembangkan sebagai material alternatif ramah lingkungan pada aplikasi helm sesuai standar SNI.

Kata Kunci: serat sabut kelapa, komposit polyester, kekuatan tarik, kekuatan dampak, fraksi volume, orientasi serat.

***ANALYSIS OF FIBER ORIENTATION AND FIBER VOLUME FRACTION
OF COCONUT COIR ON THE TENSILE AND IMPACT STRENGTH OF
COMPOSITE MATERIALS***

Muhammad Gilang Baihaqi

ABSTRACT

This study was conducted to examine the effect of fiber orientation and fiber volume fraction of coconut coir on the tensile and impact strength of polyester resin based composites. The fibers were arranged in three orientations, namely horizontal, vertical, and random, and the fiber volume fractions were varied at 10%, 15%, and 20%. Prior to fabrication, the fibers were treated with a 5% NaOH solution for two hours, and the composites were then manufactured using the hand lay up method. Tensile and impact tests were carried out in accordance with ASTM D638 and ISO 179 1 standards. The test results showed that the horizontal orientation with a 15% fiber volume fraction exhibited the best performance, with a tensile strength of 19.45 MPa and an impact strength of 0.1583 J per mm squared. In contrast, the lowest values were obtained from the vertical orientation with a 10% fiber volume fraction. Overall, coconut coir fiber reinforced composites demonstrate good potential, particularly in resisting impact loads, and therefore have promising prospects to be developed as an environmentally friendly alternative material for helmet applications in accordance with SNI standards.

Keywords: *coconut coir fiber, polyester composite, tensile strength, impact strength, fiber volume fraction, fiber orientation.*