INTISARI

Material berbahan dasar logam seperti alumunium, besi campuran, dan *chrome* yang terdapat pada komponen mobil seperti *body* mobil dan *interior* mobil memiliki sifat yang sulit didaur ulang, tidak tahan terhadap korosi, dan harga yang relatif mahal sehingga diperlukan bahan pengganti alternatif seperti serat alam. Serat alam memiliki sifat ramah lingkungan, ringan, dan tahan terhadap korosi. Salah satu serat alam yang berpotensi dapat digunakan sebagai bahan alternatif pengganti material yang berbahan dasar logam adalah serat nanas. Di Indonesia limbah dari serat nanas sangat melimpah dan belum dimanfaatkan secara optimal. Tujuan dari penelitian ini yaitu untuk membuat komposit serat nanas/*E-glass* sebagai bahan alternatif *bumper* mobil dan mengetahui pengaruh variasi perbandingan serat nanas dengan serat *E-glass* terhadap nilai ketangguhan impak dan daya serap air material komposit.

Komposit dengan perbandingan matriks dan *filler* 70:30 (fraksi volume) difabrikasi dengan *hand lay up* menggunakan metode *hot press*. Filler yang terdiri dari serat nanas dan serat *E-glass* (panjang 6 mm) dengan orientasi serat acak divariasi menggunakan perbandingan serat nanas/*E-glass* (2:1),(1:1), dan (1:2) dan disusun dengan 15 lamina. Uji ketangguhan impak dengan standar ASTM D 5942 dan uji daya serap air dengan standar ASTM D 570 dilakukan pada semua spesimen komposit. Selain itu, karakterisasi hasil patahan uji impak dan struktur mikro dari penampang lintang masing-masing dilakukan dengan *scanning electron microscopy* (SEM) dan uji optik.

Hasil dari penelitian ini menunjukkan bahwa nilai ketangguhan impak dan daya serap air semakin meningkat seiring dengan bertambahnya fraksi volume serat nanas. Nilai rata-rata ketangguhan impak tertinggi ditunjukkan pada komposit hibrida dengan variasi perbandingan serat nanas/*E-glass* (2:1) sebesar 0,0193 J/mm^2. Sedangkan hasil persentase daya serap air dan *thickness swelling* terendah terdapat pada komposit hibrida dengan variasi perbandingan serat nanas/ *E-glass* (1:2) sebesar 5,69% dan 3,76% selama 24 jam. Hasil SEM dan hasil optik menunjukkan komposit dengan perbandingan serat nanas/*E-glass* (2:1) memiliki *void, debonding,* dan *fiber pull out* lebih sedikit dibandingakan dengan perbandingan serat nanas/*E-glass* (1:1) dan perbandingan serat nanas/*E-glass* (1:2). Selain itu, hasil karakterisasi struktur mikro menunjukkan ikatan antara *filler* dan matriks saling mengikat satu sama lain, akan tetapi distribusi *filler* didalam matriks relatif belum merata.

Kata kunci : Komposit, serat nanas, serat *E-glass, hand lay up,* polipropilen.

ABSTRACT

Materials made of metals such as aluminum, iron mixture and chrome on car components like car body and interior of the car has a property difficult to recycle, not resistant to corrosion, and the price is relatively expensive so that necessary alternative subtitute materials such as natural fibers. Natural fibers have properties environmentally friendly, lightweight, and resistant to corrosion. One of the natural fiber that could potentially be used as an alternative material for replacing metal is a pineapple fiber. In Indonesia, waste from pineapple fiber is abundant and has not been used optimally. The goals of this study are to fabricate the composite of the pineapple fiber / E-glass fiber/polypropylene as an alternative to bumper car and knowing the effect of ratio variation of pineapple fiber and E-glass fiber towards impact toughness and water absorption composite.

Composites with the matrix and filler ratio of 70:30 (volume fraction) were fabricated by hand lay-up using the hot press. Fillers are consisting of pineapple and E-glass fibers in 6 mm length with a fiber orientation randomly varied using the ratio of pineapple fiber / E-glass (2: 1), (1: 1), and (1: 2), and arranged in15 lamina. Impact toughness test to ASTM D 5942 and water absorption test to ASTM D 570 was performed in all composite specimens. Moreover, the characterization of the results of impact test fracture and microstructure of the cross-section of each performed with scanning electron microscopy (SEM) and optical test.

The results showed that the impact toughness and water absorption increases with increasing volume fraction of pineapple fiber. The highest impact toughness demonstrated for the hybrid composite with the ratio of pineapple fiber / E-glass (2: 1) was equal to 0.0193 J / mm^2. While water absorption and thickness swelling for the hybrid composites with fiber ratio of pineapple / E-glass (1: 2) of 5.69% and 3.76% for 24 hours, respectively, were the lowest. Scanning electron microscopy (SEM) and optical photographs indicated that the composite with the ratio of pineapple fiber / E-glass (2: 1) have fewer voids, debonding and fiber pullout compared to those formed in composites with the ratio of pineapple fiber / E-glass fiber (1: 1) and (1: 2). Besides, the microstructural characterization results indicated the bond between the filler and matrix bind to one another, however the distribution of fillers within a relatively uneven matrix.

Keywords: Composite, pineapple fiber, E-glass fibers, hand lay-up, polypropylene.