

Pengaruh orientasi serat karbon anyam dan temperatur pemanasan terhadap sifat mekanik komposit laminate bermatrik polimer = Effect of woven carbon fiber orientation and heating temperature on mechanical properties of polymer matrix composite laminates.

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Abstrak

Dewasa ini, penggunaan material komposit polimer berpenguat serat karbon (carbon fiber reinforced polymer, CFRP) dalam berbagai bidang semakin populer dan berkembang. Hal ini dikarenakan nilai ekonomis serta sifat mekanik yang baik yang mampu dihasilkan oleh material komposit tersebut. Ada banyak faktor yang dapat mempengaruhi sifat/ karakteristik material komposit CFRP, diantaranya adalah arah orientasi serat karbon serta perlakuan panas. Penelitian ini membahas mengenai pengaruh orientasi serat anyam karbon dan temperatur perlakuan panas terhadap sifat mekanik material komposit laminate bermatrik polimer. Komposit CFRP dimanufaktur dengan menggunakan metode hand lay-up dengan variasi orientasi [0o or 90o]s, [0o or 90o]/[±45o] dan [±45o]s. Spesimen komposit selanjutnya dilakukan pemanasan pada variasi temperatur lalu dilakukan pengujian berupa pengujian tarik, tekuk, dampak, dan FTIR. Kekuatan tarik tertinggi diperoleh pada orientasi [0o or 90o]s dengan pemanasan 200 oC selama 3 jam, kekuatan tekuk tertinggi diperoleh pada orientasi [0o or 90o]s dengan pemanasan 100 oC selama 3 jam, serta energi dampak tertinggi diperoleh pada orientasi [0o or 90o]s dengan pemanasan 100 oC selama 3 jam. Hasil pengujian FTIR menunjukkan gugus fungsi polimer yang dihasilkan dari Unsaturated Polyester Resin setelah pemanasan pada temperature curing adalah ikatan C=O (ester) dan ikatan ikatan C=C (cincin aromatik).

.....Nowadays, the use of carbon fiber reinforced polymer (CFRP) composite in various fields is getting more popular and fast growing. This is due to the economic value and good mechanical properties of the composite materials can produce. There are many factors that affect the characteristics of CFRP composite materials, including orientation of the carbon fiber and heat treatment. This study discusses the effect of the orientation of carbon woven fibers and the temperature of heat treatment on the mechanical properties of polymer matrix composite laminates. CFRP composites were manufactured using the hand lay-up method with various orientations [0 or 90o]s, [0 or 90o] / [± 45o] and [± 45o]s. The composite specimens were then heating at various temperatures. Characteristics of the composites were examined in the form of tensile test, bending test, impact test and FTIR analysis. The highest tensile strength was obtained at orientation [0o or 90o]s followed by heating at 200 oC for 3 hours. The highest bending strength was obtained at orientation [0o or 90o]s followed by heating at 100 oC for 3 hours, whereas the highest impact energy was obtained at orientation [0o or 90o]s followed by heating at 100 oC for 3 hours. FTIR test showed that the polymer functional groups from unsaturated polyester resin after heating at curing temperature are C=O bonds (ester) and C=C bonds (aromatic rings).