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Gilsu Park, Hyunbum Park

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Structural Design and Test of Automobile Bonnet with Natural Flax Composite through Impact Damage Analysis

Gilsu Park^a and Hyunbum Park^{b,*}

^aDepartment of Aerospace Engineering, Chosun University
375 Seosukdong, Donggu, 502-759, Gwangju, Rep. of Korea

^bDepartment of Defense Science & Technology-Aeronautics, Howon University
64 Howondae 3gil, Impi, 54058, Gunsan, Rep. of Korea

*Corresponding author e-mail:swordship@daum.net

Abstract

In this study, it was performed structural design and analysis of the automobile bonnet with natural flax composite. The composite structure is weak to external impact damage. Therefore, the structural design through impact damage analysis was performed. For manufacturing flax/vinyl ester applied composite, RTM (resin transfer molding), which is a manufacturing process suitable for light weight and mass production, was applied. The impact test of specimen was performed to analyze the safety of structure from impact. In addition, compression strength test was performed for specimen applied with impact to measure residual strength of structure after impact to analyze structural behavior. Through the structural design and test, it is confirmed that the designed bonnet structure is acceptable.

Keywords: *B. Mechanical properties, B. Impact behavior, C. Finite element analysis (FEA)*

1. Introduction

Automobile light weight is an important area in structural design. It is a direct factor of enhancing accelerating force and braking power that are the basic performance. Light weight is advantageous for enhancing accelerating force and braking power in the case of having identical power. Since automobile light weight can maximize engine efficiency and reduce the weight ratio per power to be handled even in the case of having relatively lesser power, it can ensure superior acceleration and motion performances compared to that of heavier vehicle. In addition, fuel efficiency improvement has become essential resulting from recent environmental regulations and the arrival of high oil price era. Since 10% weight reduction is known to improve fuel efficiency by 5-7%, automobile manufacturers are seeking to achieve light weight and related parts manufacturers are also developing light weight materials in collaboration with automobile manufacturers.

Recently, there has been a growing interest in the use of natural fibers for composites design and manufacturing[1-8].

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