

Accepted Manuscript

Impact Damage Tolerance of Thermoset Composites Reinforced With Hybrid
Commingle Yarns

Erdem Selver, Prasad Potluri, Paul Hogg, Costas Soutis



PII: S1359-8368(16)00039-1

DOI: [10.1016/j.compositesb.2015.12.035](https://doi.org/10.1016/j.compositesb.2015.12.035)

Reference: JCOMB 3977

To appear in: *Composites Part B*

Received Date: 8 October 2014

Revised Date: 13 December 2015

Accepted Date: 23 December 2015

Please cite this article as: Selver E, Potluri P, Hogg P, Soutis C, Impact Damage Tolerance of Thermoset Composites Reinforced With Hybrid Commingle Yarns, *Composites Part B* (2016), doi: 10.1016/j.compositesb.2015.12.035.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Impact Damage Tolerance of Thermoset Composites Reinforced With Hybrid Commingled Yarns

Erdem Selver¹, Prasad Potluri^{2*}, Paul Hogg³, Costas Soutis²

¹Department of Textile Engineering, Kahramanmaraş Sütçü İmam University, Kahramanmaraş, 46100, Turkey

²Northwest Composites Centre, University of Manchester, Manchester M13 9PL, UK

³Royal Holloway, University of London, Egham, Surrey, TW20 0EX, UK

*Corresponding author: Prasad.potluri@manchester.ac.uk; Tel: +44-161-306-4128,

Abstract

This paper examines the potential of low-cost thermoplastic fibres in improving the impact damage resistance and damage tolerance of thermoset (glass-epoxy) composites. Polypropylene (PP) fibres, commodity fibres without any surface modifications, have been incorporated at tow-scale with the aid of air jet commingling process. Glass-PP hybrid yarns with varying proportion of PP fibres (0-35%) are converted into several non-crimp cross-ply laminates and a plain-woven laminate. Damage resistance in terms of damage area and depth are assessed for low energy (20-50J) as well as high energy (500J) drop-weight impacts; damage tolerance is assessed through Compression after Impact (CAI) tests. Overall density of the composite laminate has reduced by 16% due to the introduction of PP fibres; at the same time total absorbed energy has increased by 22% during a high velocity impact test due to a toughening mechanism by PP fibres. Non-crimp laminates absorbed more energy at low velocity impacts in comparison to woven laminates, possibly due to extensive tow-level delaminations. On the other hand, a much larger dent depth was observed in the woven laminate after low energy impact. Compression after Impact (CAI) tests indicated that woven laminates retained 83% of compressive strength while non-crimp laminates retained 50-60%, depending on proportion of thermoplastic fibres, and standard glass fibre laminates retain around

Download English Version:

<https://daneshyari.com/en/article/7212822>

Download Persian Version:

<https://daneshyari.com/article/7212822>

[Daneshyari.com](https://daneshyari.com)