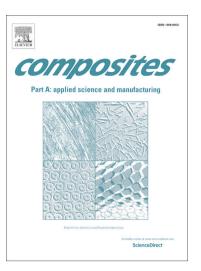
### Accepted Manuscript

The Effects of Fiber Orientation and Adhesives on Tensile Properties of Carbon Fiber Reinforced Polymer Matrix Composite with Embedded Nickel-Titanium Shape Memory Alloys

Derek Quade, Sadhan Jana, Gregory Morscher, Manigandan Kannan, Linda McCorkle

PII:	S1359-835X(18)30333-6
DOI:	https://doi.org/10.1016/j.compositesa.2018.08.019
Reference:	JCOMA 5153
To appear in:	Composites: Part A
Received Date:	12 April 2018
Revised Date:	16 August 2018
Accepted Date:	17 August 2018



Please cite this article as: Quade, D., Jana, S., Morscher, G., Kannan, M., McCorkle, L., The Effects of Fiber Orientation and Adhesives on Tensile Properties of Carbon Fiber Reinforced Polymer Matrix Composite with Embedded Nickel-Titanium Shape Memory Alloys, *Composites: Part A* (2018), doi: https://doi.org/10.1016/j.compositesa.2018.08.019

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.

## ACCEPTED MANUSCRIPT

The Effects of Fiber Orientation and Adhesives on Tensile Properties of Carbon Fiber Reinforced Polymer

Matrix Composite with Embedded Nickel-Titanium Shape Memory Alloys

Derek Quade<sup>a,\*</sup>, Sadhan Jana<sup>b</sup>, Gregory Morscher<sup>b</sup>, Manigandan Kannan<sup>b</sup>, Linda McCorkle<sup>c</sup>

<sup>a</sup> Glenn Research Center, Cleveland, Ohio

<sup>b</sup> University of Akron, Akron, Ohio

<sup>c</sup> Ohio Aerospace Institute, Brook Park, Ohio

\* Corresponding Author, Derek.J.Quade@nasa.gov

#### Abstract

Tensile tests of Nickel-titanium (NiTi) shape memory alloys (SMA) embedded within carbon fiber reinforced polymer matrix composite (CFRP/PMC) laminates were evaluated with simultaneous monitoring of modal acoustic emissions (MAE). Three different layup configurations utilizing two different thin film adhesives were applied to bond the materials. Ultimate tensile strengths, strains, and moduli were obtained along with cumulative AE energy of events and specimen failure location. Scanning electron microscopy was used to examine the break areas of the specimens post-test. Microscopy was used to validate failure locations revealed from MAE analysis. A unique finding within this research showed that 90° plies in the outer ply gave the strongest acoustic signals as well as the cleanest fracture of the specimens tested. Overlapping 0° ply layers surrounding the SMA was found to be the best scenario to prevent failure of the specimen itself.

#### Keywords:

- A. Layered Structures
- B. Polymer Matrix Composite
  - C. Acoustic Emissions
  - D. Mechanical Testing

Download English Version:

# https://daneshyari.com/en/article/10128349

Download Persian Version:

https://daneshyari.com/article/10128349

Daneshyari.com