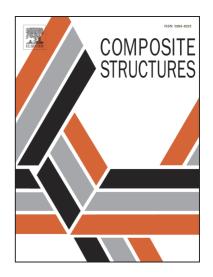
Accepted Manuscript

Experimental studies on a two-step technique to reduce delamination damage during milling of large diameter holes in CFRP/Al stack

Gong-Dong Wang, Melly Stephen Kirwa, Nan Li

PII:	S0263-8223(17)32519-9
DOI:	https://doi.org/10.1016/j.compstruct.2018.01.039
Reference:	COST 9279
To appear in:	Composite Structures
Received Date:	7 August 2017
Revised Date:	14 December 2017
Accepted Date:	10 January 2018



Please cite this article as: Wang, G-D., Kirwa, M.S., Li, N., Experimental studies on a two-step technique to reduce delamination damage during milling of large diameter holes in CFRP/Al stack, *Composite Structures* (2018), doi: https://doi.org/10.1016/j.compstruct.2018.01.039

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

Experimental studies on a two-step technique to reduce delamination damage during milling of large diameter holes in CFRP/Al stack.

Gong-Dong Wang^{1,2}, Melly Stephen Kirwa^{1*}, Nan Li^{1**}

¹School of Aerospace Engineering, Shenyang Aerospace University, Shenyang 110136, China ²Key Laboratory of Fundamental Science for National Defense of Aeronautical Digital Manufacturing Process JSCR

CORRESPONDING AUTHORS:

Name: Stephen Kirwa Melly* Email: kirwamellie@yahoo.com Phone: +8613032426148 Address: Shenyang Aerospace University N0. 37 Daoyi South Avenue Development District. Shenyang, P.R. China. 110136 Fax: 8624-89724298

Name: Nan Li** Email: daidaidegaga@gmail.com. Phone: +8618804087780 Address: Shenyang Aerospace University N0. 37 Daoyi South Avenue Development District. Shenyang, P.R. China. 110136 Fax: 8624-89724298

ABSTRACT

Non-conventional hole-making machining processes are being adopted to manufacture holes in the difficult to cut materials like carbon fiber reinforced polymer (CFRP) composites. Of the many non-conventional processes, helical milling remains the most favorable and the best alternative to conventional drilling. It possesses several advantages including low cutting forces, reduced tool wear and improved hole quality. The use of composites in conjunction with metals is very common in aerospace industry and the most common configurations are CFRP/Al and CFRP/Ti-6Al-4V. In this work, a two step process for helical milling in CFRP/Al stack is proposed and experimented then the results are compared with that of conventional drilling. In the first step, milling is done on the CFRP/Al stack starting on the composite part then the workpiece is flipped so that in the second step milling starts on the metal part. Results show that helical milling reduces axial forces by about 35% compared to that of conventional drilling. The forces involved in the second step were found to be about 25% less than that of the first step in the helical milling process. Reduction in forces consequently leads to less damage as scanning electron microscope (SEM) images of the machined holes show.

Keywords: CFRP/Al stack, Thrust forces, Helical milling, Hole quality, Conventional drilling,

Download English Version:

https://daneshyari.com/en/article/6704107

Download Persian Version:

https://daneshyari.com/article/6704107

Daneshyari.com