

TRACK 1: STRUCTURES AND ADDITIVE MANUFACTURING

“DEFECT INSPECTION, TESTING AND REPAIR METHODS FOR DAMAGED PREPREG COMPOSITES OF AIRCRAFT STRUCTURES”

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ABSTRACT

This research paper provides several non-destructive evaluation approaches and innovative methods to repair 3 different defects in aircraft composite structures made of carbon fiber reinforced polymer (CFRP) without honeycomb core. The main aim of this intensive research work is to assess the defects accurately and to restore the major mechanical and thermal strengths of the repaired parts to their pristine status to use in aircraft. Several non-destructive, compression-after impact (CAI) and flexural tests have been conducted on pristine, damaged and repaired specimens.

Defects due to Impact Damages

A new resin-injection repair of low-velocity barely visible impact damage (BVID) has been developed to investigate the effect of vent holes on the mechanical properties of CFRP solid laminate and the BVID repair of in aerostructure.

Defects due to Thermal Damages

For the assessment of the hot air effects on aircraft composite structures, an intensive experimental work has been conducted to characterise thermal defects in composite surfaces using a newly designed hot air generating machine.

Defects due to Galvanic Corrosion between Aluminium and Composites

An effective ultrasound method has been developed for the non-destructive evaluation of galvanic corrosion in composite-aluminium hybrid aerostructure of aging aircraft, particularly for passenger-to-freighter (P2F) conversion.

BIOGRAPHY OF SPEAKER



Hamid received his PhD and MSc degrees in Aerospace Engineering (Aircraft Design) from University of Manchester in UK. Hamid is the principal lecturer (Industry) at Republic Polytechnic since Feb 2011. He has 7-year industry work experience in two aircraft design & manufacturing companies & 15-year teaching and research work experience at nine universities & polytechnics on part-time and full-time basis. He has been associate dean, deputy director, aircraft designer, lecturer, manager & design engineer in UK, Iran, Malaysia & Singapore in the last 25 years. Hamid has 88 publications and received the Crescendas Medal for Outstanding Applied Physics Research from Institute of Physics Singapore on Feb 2017, MOE Outstanding Innovator Award 2018, and ExCEL Innovation Champion from Public Service Division on July 2018. Hamid is leading several funded projects in Smart MRO and aircraft composite repair in cooperation with aircraft industries, NUS, Newcastle University & Glasgow University in Singapore.

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