Advanced Fiber Reinforced Polymer Materials Guidelines for Aircraft Design Certification Process

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ABSTRACT

As an advanced material of increasing interest to the aerospace community, thermoplastic composites have been selected for this initial phase of the advanced fiber polymer matrix composite program. A framework for the qualification of thermoplastic continuous fiber composites has been developed and is currently being applied to a PAEK composite material. The material, HexTow AS4D 12k/TenCate TC1225 unidirectional tape, was selected based on feedback from an Industry Steering Committee (ISC) survey at the start of the program. Throughout the duration of the program, the ISC has played an integral role by providing expertise in areas such as test method applicability, test temperature selection and test plan reviews.

A number of physical and mechanical trial tests were conducted in conjunction with recommendations by the ISC prior to finalizing the test matrix. The trials included DMA and TMA, short beam strength, in-plane shear, and open hole compression (lamina and laminate) tests at several conditions from room temperature up to 450°F in both ambient and wet conditions. The results of these tests, along with the finalized test matrix, will be presented.

An overview of the entire program, including the status of the qualification program, specification development and plans to submit the data and guidelines to CMH-17 and specifications to SAE International, will also be presented.