## Boeing Simulates Thermal Expansion in Composites with Expanded Metal Foil for Lightning Protection of Aircraft Structures

Modern aircraft such as the Boeing 787 Dreamliner are comprised of more than fifty percent carbon fiber composite requiring the addition of expanded metal foil for lightning strike protection. Researchers at Boeing are using simulation to verify that protective coatings on the metal foil will not fail due to thermal stress arising from a typical flight cycle.

#### BY JENNIFER A. SEGUI

The Boeing 787 Dreamliner is innovative in that it is comprised of more than fifty percent carbon fiber reinforced plastic (CFRP) due to the material's light weight and exceptional strength. Figure 1 shows the extensive use of composite materials throughout the aircraft. Although CFRP composites

inherently have many advantages, they cannot mitigate the potentially damaging electromagnetic effects from a lightning strike. To solve this problem, electrically conductive expanded metal foil (EMF) can be added to the composite structure layup to rapidly dissipate excessive current and heat for lightning protection of CFRP in aircraft.

Engineers at Boeing Research and Technology (BR&T) are using multiphysics simulation and physical measurements to investigate the effect of the EMF design parameters on thermal stress and displacement

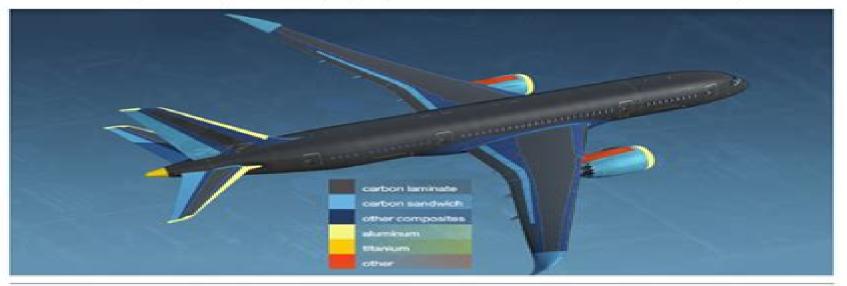


FIGURE 1. Advanced composites used throughout the Boeing 787 account for more than fifty percent of the aircraft body".

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