Embedded Sensor Processes for Aviation Composite Structures

OBJECTIVE / SOLUTION

Develop and demonstrate new manufacturing techniques for integrating sensor networks on composite aviation structural components.

Due to limited flexible sensor technology, some helicopter airframes have been historically passive and function without the ability to detect and assess structural damage. Continual upgrades to add more capable mission equipment to the aircraft have increased weight and stresses on the airframe with no way to monitor the lifetime effects on the structural components. There is a strong need to incorporate structural monitoring and battle damage detection capabilities into these structures.

ACHIEVEMENTS

Successful testing has been completed including: ground testing of the sensor network in the Composite Vertical Stabilizer (up to 100% of max load for landing gear, 60% of max flight load testing, and 90% of maximum load) and ballistic testing of sensors on composite panels at Aberdeen Proving Grounds. All panels and sensors performed as predicted.

BENEFITS

• Advance the capability for aircraft damage detection
• Provide opportunity to integrate into the aircraft platform condition-based maintenance system to produce structural health indicators
• Leverage the composite structures to produce lighter aircraft structures to allow for more mission equipment that can expand the soldier and aircrew warfighting capabilities
• Increase aircraft survivability
• Potentially can save lives

POC:
Army ManTech Manager, U.S. Army Research, Development, and Engineering Command (RDECOM), Aviation Missile Research, Development and Engineering Center (AMRDEC), Manufacturing Science & Technology Division, ATTN: RDMR-SEM, 5400 Fowler Road, Redstone Arsenal, AL 35898-5000