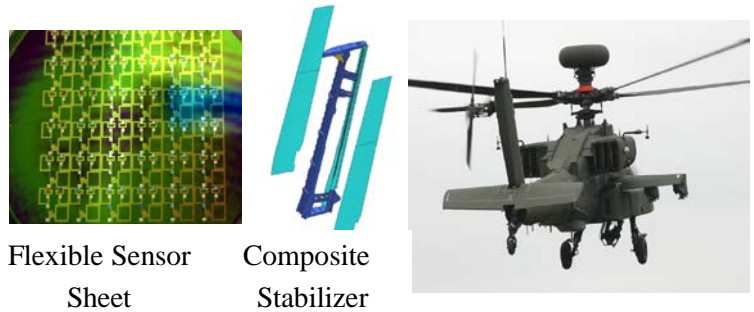


# Embedded Sensor Processes for Aviation Composite Structures

## PROBLEM / OBJECTIVE

Army helicopters such as the AH-64 Apache have been in service for over 20 years there is limited sensing and diagnostic technology to assess the health of the airframe. These airframes function without the ability to detect and assess damage because sensors are too rigid, heavy, and expensive for widespread implementation. This capability will enable lighter weight systems to collect information on the effects of vibration, shock, and battle damage to the airframe.



Flexible Sensor Sheet

Composite Stabilizer

## ACCOMPLISHMENTS / PAYOFF

### **Process Improvement:**

Embedded sensors with the capability to send real-time battle damage information to the cockpit and has potential future application for integration into the Apache Condition-Based Maintenance (CBM) system for structural monitoring.

These sensors not only allow a pilot to determine his battle damage and flight worthiness, but gives the depots the tools necessary to detect possible failure points and early fatigue areas. Sensors sheets include strain sensors, thermistors, and accelerometers to monitor and collect effects of vibration, strain, and damage to the airframe.

### **Implementation and Technology Transfer:**

The Sensor network, composite aircraft structure components, and special integration tooling transitioned to the Apache Program Office in 3Q FY12 for insertion/cut-in FY17 into the AH-64 Block III Upgrade Program. Discussions on transition and spin-off efforts also include composite repair techniques for use in the field. Use of sensors on the UH-60 horizontal stabilator is also under consideration.

### **Expected Benefits and Warfighter Impact:**

- Provides the Warfighter with affordable, real time aircraft ballistic detection indication capability
- Reduced cost of sensor sheet by over 65% (\$2000 per sheet to \$700 per sheet)
- Decreases airframe weight as a result of lighter weight sensors
- Ability to gather airframe vibration/strain effects to potentially increase TBO (Time Between Overhaul) of airframe by 800 hrs (8%)

## TIME LINE / MILESTONE

Start Date	December 2007
End Date	June 2012

## FUNDING

U.S. Army ManTech	\$4.9M
PM Apache	\$3.6M

## PARTICIPANTS

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