

## SHeMS - A lightweight structural health monitoring (SHM) system

SHeMS is a collaborative project aimed at developing a lightweight structural health monitoring system for aircraft. Through the development and application of energy harvesting, acoustic emission (AE) and acousto-ultrasonic (AU) techniques, the project intends to deliver a solution that is suitable for deployment on critical aircraft components, capable of determining their structural integrity.

Reliability and safety are critical to the aerospace industry. SHeMS is an opportunity to make a major leap forward in these areas by offering continuous inspection coverage for aircraft both on the ground and in flight. Existing non-destructive testing techniques, while effective, rely on taking an aircraft out of service. This downtime is very expensive and means that there are large time periods between inspections.



### Project objective

The objective of SHeMS is to develop a stand-alone, self-supporting, permanent inspection system to provide in-service, continuous monitoring of aircraft components, eg flaps or rotor blades. The system will detect and quantify degradation in composite and metallic structures (delamination, fibre breakage, corrosion, fatigue and impact damage faults) enabling repair work at an early stage, thus extending the lifecycle of high added value materials and reducing waste.

SHeMS aims to:

- Develop lightweight, flexible acoustic transducers for permanent, or semi-permanent, fixing to aircraft components.
- Develop AE technology and equipment for detection of faults in aircraft components.
- Develop AU technology and equipment for locating and determining the size of faults in aircraft components.
- Develop independent hardware modules capable of operating under their own power via energy harvesting and communicating wirelessly with a central hub.

Routes of exploitation include the aircraft development sector and military applications. When applied to aircraft in the development stage it will provide both the design engineers and pilots with component safety information. Similarly, up-to-the minute information about the structural integrity of their aircraft will be a valuable asset to military operators; pilots can have confidence in their planes and the engineers on the ground have the benefit of knowing where potential problems are ahead of time. The project partnership pulls together expertise from highly respected research organisations and industrial experts, as well as globally-operating aerospace companies.

The SHeMS project was funded by the Technology Strategy Board. For further information, please visit the project website at [www.shemsproject.co.uk](http://www.shemsproject.co.uk).



Technology Strategy Board  
Driving Innovation