

## AURORAS - Advanced ultrasonic imaging of composite repairs in aero-structures

Composite structures are increasingly utilised in aircraft for their stiffness, light weight and corrosion resistance. However, the structures are sensitive to in-service impact that can cause defects. Damaged areas are repaired using an adhesively bonded composite repair method. However, the repair process is sensitive to process parameters and small deviations from composite repair specifications and subsequent flaws could lead to substantial compromise in the final mechanical performance of the repair and the integrity of the structure.

The inevitable differences between laboratory and repair shop conditions could result in an increased chance of flaws in in-situ repairs requiring identification and assessment before the certification of methods and the release of individual aircraft to flight. The inspection of composite repairs to assess their integrity is difficult and not yet sufficiently developed to meet quality requirements.

Current phased array inspection is based upon linear scanning techniques at normal angles to the surface. This is because the anisotropic nature of the composite leads to acoustic velocities that vary with angle of incidence, rendering conventional focal law calculators inaccurate.

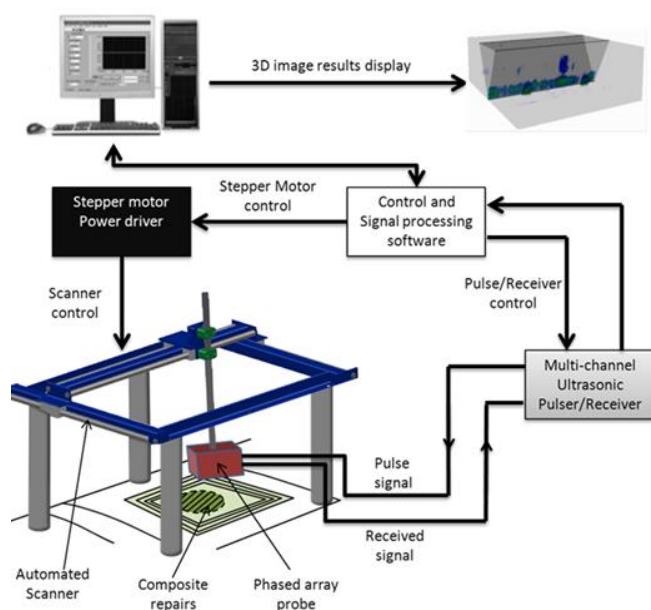
### Project objective

This project will investigate the acoustic velocity changes and derive algorithms that account for velocity variation effects. The aims are:

- Development of an automated phased array (PAUT) and Total Focusing Method (TFM) system made of sensors; signal processing, software and techniques that will enable imaging composite repair flaws.
- Development of imaging software that can be manipulated in 2D or 3D. Design and development of an encoded scanning manipulator with transducer array couplant feed system to match the configuration of the aero structure sections to be inspected.
- Propose defect acceptance criteria based on the type of application (e.g. tail fin surface) and repair technique used, and with the experienced input from the lead industry partner.
- Develop and optimise the state-of-the-art shearography technique and procedures for comparison with the developed automated PAUT and TFM technique in order to assess its viability against a complimentary NDT technique.

For further information, please visit the project website at [www.aurorasndtproject.co.uk](http://www.aurorasndtproject.co.uk)

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