



## NDT inspection of inaccessible electrical wiring in ageing aircraft

- **Project budget: £1.3m**
- **End Users: BA, Airbus, Marshall Aerospace**

Degradation and failure of aircraft wiring insulation can result in potential flight safety critical system failure or smoke and fire due to arcing. With two air accidents in recent years involving great loss of life caused by wiring failure and more than 400 wire related major incidents in the last 30 years, the integrity of aging aircraft wiring is a significant and growing concern for aviation regulators, aircraft operators and maintainers.

This project developed three novel NDT techniques and delivery systems designed to increase confidence in the integrity of the wiring in an aircraft by detecting flaws in the wiring or insulation:



### 1) Enhance Time Domain Reflectometry (TDR)

This system allows detection of insulation damage in electrical wires, and shield and braiding damage in coaxial and shielded twisted pair cables.

### 2) Long Range Ultrasonics system

The method utilises ultrasonic waves, pulsed along a wave-guide, which become reflected at discontinuities.

### 3) Infra-Red thermal imaging system

If the insulation is defective, the defective area will have a different heating/cooling rate from the rest of the wire. So the defect effectively identifies itself

One of the major economic benefits of the three techniques is the possible early detection of incipient flaws in the wiring system of the aircraft. The combination of the three systems allows rapid detection of defective insulation through a process of successive localisation. This can then be either repaired or replaced by a new wire. The combined use of these systems in the long term could not only significantly improve the reliability of aircraft wiring but also be financially advantageous.

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