StirScan - Detection of kissing bonds in friction stir welds in aero structures

The proposed StirScan project will develop a non-destructive testing (NDT) system in order to address the challenging problem of detecting kissing bonds in friction stir welds. Friction stir welding (FSW) is a joining technique for aluminium alloys which offers good joint performance and excellent reproducibility.

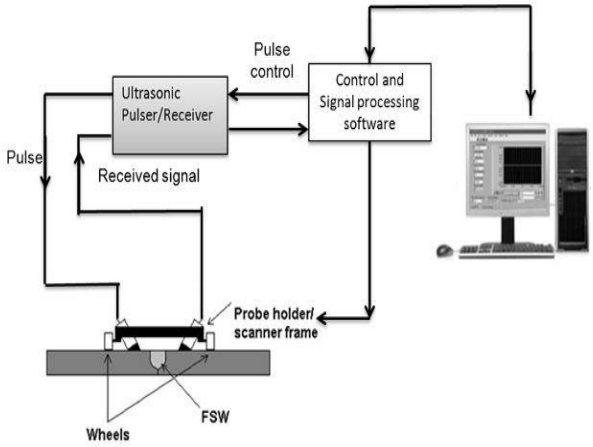
A kissing bond is a specific type of defect in solid-state bonding in which two solid materials are in contact but with little or no metallurgical bonding present. Kissing bonds are a concern with FSW as such features can reduce fatigue performance of joints and are currently very difficult to detect (or accurately size) using existing NDT methods. This concern limits the adoption of FSW joining in aerospace, particularly for critical components. Effective detection of kissing bonds would open up a much wider range of applications, including safety-critical subcomponents. Enabling the adoption of FSW into the wider, SME dominated, aerospace component market is potentially a €43bn opportunity. The StirScan NDT inspection system will provide a reliable and cost saving method of detecting kissing bonds.

Project objective

The StirScan project will develop a new NDT method to enable the detection of kissing bond defects below 0.3mm in length in aerospace components. A novel non-linear ultrasonic technique and an oblique incidence, high frequency ultrasonic technique will be used for the assessment. The project will:

- Establish detailed specification of critical defect size, with associated effect on mechanical behaviour.
- Design and develop a prototype instrument for a pulser-receiver system associated with a pulser generator capable of providing high voltage and data acquisition systems.
- Develop a data analysis algorithm and data collection and processing software.

The technique will lead to a more sensitive measurement of interfacial defects and will detect small kissing bond flaws. A scanner with an incorporated probe holder will be designed and manufactured that will enable rapid inspection of FSW.



The developed NDT inspection system will allow assessment of high performance aluminium FSW joint components for aero structures. This work will support the increased adoption of FSW in the aerospace industry.

For further information, please visit the project website at **www.stirscan.eu**.

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under Grant agreement number 315436.