Enhancing the Remaining Useful Life of Aeronautic Composite Structure based on Structural Health Monitoring Concept

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**Scientific Context.** Aeronautic composite structures are required to be lifecycle managed under the damage tolerant principle, while the airworthiness is maintained through the process of scheduled inspection, and if needed repair or replacement. In that sense, the scheduled inspection of a structural component is addressed by non-destructive inspection (NDI) techniques. However, this current practice can be cost consuming, which is mainly due to the high degree of human interaction, and the fact that the structural components, which are difficult to access have to be disassembled. To reduce the inspection cost, Structural Health Monitoring (SHM) concept has emerged in the aeronautic industry. The basic concept of SHM is to acquire and analyze data from on-board sensors to determine the health of a structure in the sense of: (i) diagnostics (detection, localization, damage size estimation) and (ii) prognostics. The proposed PhD position will address the challenge of enhancing the Remaining Useful Life (RUL) by means of SHM, with an application to composite structures subjected to damage and its propagation due to operational and environmental conditions. The PhD student will focus on developing prognostic methods for efficient RUL estimation, with emphasis on guided wave sensing, advance signal processing and data driven tools.

**Working Context.** Safran Tech will hire the PhD student under a limited-term contract. The work will be carried out at Safran Sensing Department, which closely works with the faculty of Aerospace Engineering of Delft University of Technology.

Safran is an international high-technology group, operating in the aviation (propulsion, equipment and interiors), defense and space markets. Safran has a global presence, with more than 95,000 employees and sales of 21 billion euros in 2018. Working alone or in partnership, Safran holds worldwide and European leadership positions in its core markets. The group undertakes Research & Development programs to meet fast-changing market requirements, with total R&D expenditures of around 1.5 billion euros in 2018.

The faculty of Aerospace Engineering of Delft University of Technology is one of the world’s largest faculties devoted entirely to aerospace engineering. It covers the whole spectrum of aerospace engineering subjects ranging from aerodynamics and flight propulsion to structures and materials and from control and simulation to air transport and operations. The faculty has around 2,700 BSc and MSc students, 225 PhD candidates and 27 professors supported by scientific staff.

**Requirements.** You have a master’s degree in Mechatronics Engineering or equivalent experience, demonstrating a solid background in experimental testing, ultrasonic sensing, advanced signal processing and multi-physics modeling. The knowledge of data-driven tools, statistics and model fusion are desirable. Moreover, the following is required:
- strong motivation, scientific curiosity and proactivity,
- flexibility/mobility for working in France and going on secondments to Germany and Netherlands
- openness, team spirit
- strong ability to work autonomously.

Your application. Please note that only applications with a CV, a motivation letter and the certificates / diplomas will be considered. Please combine all necessary documents in one PDF file and send your application with the subject “ESR13” to recruitment@gw4shm.eu. Please note that you can apply for more than one position, in this case please indicate your order of preference. Furthermore, for Safran Human Resources traceability, the application has to be submitted through Safran Talent. For more details or in case of any technical questions concerning this position, please contact Dr. Rafik Hadjria at rafik.hadjria@safrangroup.com.