

Internship tutors:  
Joel JEZEGOU

Internship with ISAE SUPAERO - Toulouse

Location: **ISAE SUPAERO - Toulouse**

Starting Date: between 01/03/2023 and 01/05/2023

Duration: 6 months

## **Hydrogen aircraft safety and airworthiness**

ISAE-SUPAERO is an institute dedicated to aerospace engineering higher education and research. ISAE-SUPAERO develops a research focused on the future needs of aerospace or high-tech industries.

The ISAE-SUPAERO Department of Aerospace vehicles design and control (DCAS) supports activities related to the design and development of aerospace systems. The DCAS researchers belong to three research groups:

- Aerospace vehicle design
- Decision and Control
- Neuro-ergonomics and human factors

The research groups collaborate on the following topics:

- Design and operation of safer aircraft
- Integrated multidisciplinary design of aircraft
- Advanced space concept.

The intern will be integrated in the Aircraft Design research team of DCAS Department.

Hydrogen (H<sub>2</sub>) has been identified as a replacement for kerosene in airplane. The European Clean Aviation Strategic Research and Innovation Agenda highlights that safety aspects and anticipation of future certification requirements are a significant topic to be addressed in a timely manner to allow certification of hydrogen-powered airplanes. In this context, the objective of the internship is to identify - on key safety risks - airworthiness regulatory gaps with respect to the certification of a generic airplane that uses hydrogen as the source of energy to be burnt in an engine. And then to implement a safety risk management approach to formalize and monitor how those risks are and will be addressed through certification and/or other mitigation means (operations, safety-by-design, etc.).

The tasks to be conducted during the internship are:

- Focusing on a to-be-defined generic H<sub>2</sub>-burn aircraft concept, to synthesize risks inherent to hydrogen technology and their effects on safety, based on previous work at ISAE-SUPAERO and available literature.
- To analyze the existing airworthiness regulations (typ. EASA CS-25, CS-23 and CS-E) to assess and document their adequacy to address abovementioned risks. A prioritization will be established to narrow-down the scope of the analysis and focus on critical risks. This task consists in the analysis of existing certification requirements and of existing acceptable means of compliance or standards with respect to H<sub>2</sub> risks, and in the analysis of risks that are not properly addressed in the regulations.
- To formalize a model-driven approach to present safety hazards, their mitigation and prevention barriers in the field of certification (safety risk management approach), that will allow to highlight gaps in the regulatory framework; safety case technique is one possibility to explore for this purpose;
- To document the findings in a research report and/or research publication.

### **EQUIRED SKILLS**

Skills: Aircraft safety and airworthiness, aircraft architecture, systemic interdisciplinary background  
Soft skills: autonomy, curiosity, proactivity to propose solutions to address a problematic

### **APPLICATION FOR INTERNSHIP**

To apply : CV and motivation letter to be send by email to Joël JEZEGOU ([joel.jezegou@isae-supero.fr](mailto:joel.jezegou@isae-supero.fr))

For further information: please contact the above mentioned contacts.