# Research engineer or Postdoctoral position in Overall Aircraft Design for H2-Powered Light Airplanes

## *Context*

ISAE-SUPAERO is an international reference institution for higher education and research in the field of aeronautics and space. ISAE-SUPAERO's research is based on scientific knowledge, models, methodological approaches and tools for the design of aeronautical, space and embedded systems.

The scientific activity of the Research and Teaching Resources Directorate is organized into departments, including the Department of Aerospace Vehicles Design and Control (DCAS). The DCAS carries out education and research activities related to the development of engineering models, methods and tools for the design and operation of aerospace vehicles.

DCAS researchers are divided into 4 research groups (Aircraft Design, Space Vehicles Design, Decision and Control, Neuroergonomy and Human Factors) which contribute to 3 research themes:
- Integrated Multidisciplinary Aircraft Design;
- Humans, Systems and Interactions;
- Advanced space concepts.

A position is opened in the Aircraft Design research group, contributing to the research theme Integrated Multidisciplinary Aircraft Design. The position is within the framework of the research chair ISAAR "Innovative Solutions for Aviation Architecture and Regulation" with our industrial partner Daher.

## *Justification of the position*

DCAS is involved in the definition, evaluation and certification of innovative aircraft concepts, including introduction of innovative technologies (e.g. electric, hybrid-electric, hydrogen technologies). To support the activities of DCAS professors and researchers, a position of fix-term research engineer or post-doctoral fellow in aircraft design is opened in the research group. He/She will be involved in the development of FAST-OAD, an aircraft design code, co-developed by ISAE-SUPAERO and ONERA under an OpenMDAO framework.

## *Missions*

1. Contribution to the development of the multidisciplinary aircraft design, analysis and optimisation platform FAST-OAD, and more specifically FAST-OAD-GA its branch dedicated to conceptual and preliminary design of CS-23 aircraft at the conceptual and preliminary design stages. The planned tasks are :
   - To formalize, code and document into FAST-OAD-GA a design methodology adapted for hydrogen-powered light airplane (fuel cells, H2-burning turbine, hybridization);

- To develop, code and document into FAST-OAD-GA the scientific models required for hydrogen-powered light airplane (components and systems modeling, airframe integration, interactions), using the appropriate modeling levels of fidelity;

Those developments will start from the existing public version of FAST-OAD-GA (available in an open-source distribution https://github.com/supaero-aircraft-design/FAST-GA), and from existing private versions.

2. Inside the research group, contribution to the design and multidisciplinary analysis and optimization of hydrogen-powered CS-23 aircraft concepts (conceptual and preliminary designs) including :
   - Contribution to the identification of relevant innovative architectures;
   - Proposition and study of technological solutions for H2 storage, systems, energy/power management, etc.;
   - Sensitivity analysis of the factors of technological evolution for the innovative solutions to be introduced in the architectures ;
   - Evaluation with FAST-OAD of identified architectures, with due consideration of aircraft-level risks and safety features related to H2;
   - Delivery of documented use-cases, to allow a FAST-OAD-GA user to develop its own evaluation

3. Scientific publications and production of scientific reports on the studies carried out.

## *Required profile for the candidate*

The candidate has skills in the following fields: aeronautical systems and components, aeronautical engineering, multidisciplinary design and optimization tools.
A solid background in programming in Python language is required.
An experience in programming under OpenMDAO framework is desirable.

Experience on fuel cells, H2-power solutions, safety assessment would be a plus.

Fluency in written and spoken English is required.

## *Duration of the position*

15-month fix-term contract

## *Contacts*

For further information, please contact Joël Jézégou - joel.jezegou@isae-supaero.fr (+33 (0)5 61 33 83 55)

## *To apply*

Send your CV and motivation letter to:
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## *Deadline to apply:* 30/06/2022