

## SUPER – Stuttgart University Program for Experiencing Research Project Information

Institute's Information	
Name of Institute	Institute of Aircraft Design
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Duration of Project/	Number of Students
June/July	
June/July/August	X
Number of Students	
Name of Project	Electric and hybrid electric flight
	Analytical Aircraft Design
Beneficial Skills & Knowledge	Matlab, CAD, Aircraft Design, FEM, CFD, general craftmanship, composite construction, electrical knowledge, model aircraft pilots, glider pilots,

## **Description of Work**

The Institute of Aircraft Design focuses on economic and ecologic aircraft. The research group is working in various fields of activity, mainly theoretical aircraft design and applied aircraft engineering.

The preliminary Aircraft Design is a multidisciplinary iterative process with many interfaces and dependencies. Computing tools like Matlab, Excel, Mathcad can help to create a larger variety of options for optimization for the Aircraft Design Engineer. In this research project different tools and modules of the Aircraft Design process shall be adapted and integrated as part of the Aircraft Design Toolbox. The Toolbox shall have defined interfaces and link the output to a variety of analysis software like Computational Fluid Dynamics or CAD.

Additionally, the team works with flying prototypes with solar-, battery electric and hybrid electric propulsion in order to find a viable way to reduce emissions and operating cost for future aircraft.



The whole spectrum of applied aircraft design is being utilized from general structural engineering to efficient aerodynamics and electrical drivetrain layout. With a great range of the mentioned engineering fields, we are open to almost all disciplines of technical background.

The manned aircraft team is currently consisting of 6 academic positions and a varying number of students to work with.

In 2021 and 2022, the hybrid electric aircraft e-Genius flew a number of test flights including 12 new FAI world records for electrically driven aircraft. In 2024, the goal is to further develop and flight test the aircraft to enable electric and automated glider towing with an upgraded primary propulsion system for higher power output.

Another ongoing project of the research group is the 1-seat solar aircraft icaré 2. The aircraft is planned to be modified with a distributed propulsion system of 7 motors. Focus of the investigation is the effect on the operation of the aircraft with distributed electric propulsion, and the specification of the human-machine-interface necessary for such aircraft configurations. Further focus is to translate and extrapolate the efficiency and the application of the findings to future aircraft projects

Depending on the progress of the projects and most importantly on the skills and interest of the applicant, there will be tasks including mechanical and electrical integration aspects, subsystem design and most likely system optimization.

A structured and solution-oriented approach is expected. The work will be in close collaboration with the team.



