

About the company

Marenco Swisshelicopter is a young and innovative Aerospace Company which is working on the development and production of a new single turbine engine Helicopter, the SKYe SH09. The *Marenco Swisshelicopter Group* (MSH) has grown significantly during the last years, with more than 200 employees currently, at locations in Switzerland and Germany. The single turbine engine helicopters build the biggest segment of the helicopter market. Major aircraft manufacturers, however, prefer to invest in bigger sized twin turbine engine, and more expensive, models due to the higher sales margin of the products. One direct consequence of this trend is extending the innovation cycle for the single engine helicopters, to more than twenty years, meaning that in practice no new helicopter designs have been developed



during the last thirty years in the entire single engine segment. MSH has seized the opportunity to disrupt the aircraft market with an innovative design of a 2.5 metric ton class helicopter, based on user experience, swiss quality engineering and incorporation of state of the art technologies.

The first SKYe SH09 prototype started flying in October 2014, and since then two more prototypes have been manufactured and have performed more than fifty hours of flight testing. A series prototype is under development now in order to obtain commercial flight approval by the *European Aviation Safety Agency* (EASA), and series manufacturing is planned to launch within two years.

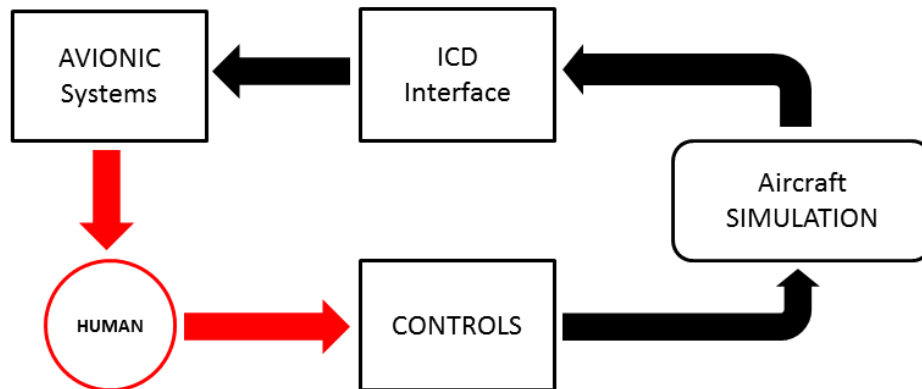
About the project



In the past years the Electronic Flight Instrument Systems (EFIS) and full glass cockpits have become more popular, especially in the fixed wing applications. Such systems are highly integrated and can feed flight critical information to the pilot. However, on light single engine rotorcraft applications, their full integration is still uncharted territory.

In MSH a project was launched in October 2017 to design, develop and verify a closed-loop test rig comprehending the avionics, electrical and control systems of the SKYe SH09. Such a rig design is conceptually sketched in the picture below. The test rig will be under configuration control and will be able to replicate the actual conditions occurring during the flight of the aircraft with a high level of

fidelity. The test rig will support engineering development tests and formal demonstration to the authorities for purposes such as abnormal condition testing or validation of the Human Machine Interface. The avionic systems are defined by MSH in collaboration with its suppliers, and will be provided for this project.



The Master Thesis will take place in the frame of this project, and the **main goal** will be to analyse, define and build the different system interfaces, to incorporate the flight dynamics of the SKYe SH09 helicopter in the simulation environment and to design the Human – Machine environment.

The following **activities** shall be carried out to realise the above goal:

- Literature research about closed loop testing, rotorcraft dynamics simulation and testing certification requirements.
- Definition of functional and physical requirements of the Human Machine Interface validation, as well as of the simulation software and hardware.
- Collection of the SKYe SH09 flight dynamics, in collaboration with the Flight Physics engineers of MSH, and later software implementation.
- Development of closed loop simulation of SKYe SH09.
- Development of the interface between SKYe SH09 simulation SW and test rig.
- Generation of the design data (Schematics, hardware BOM, documentation, test procedures).
- Verification of the complete test rig functionalities.
- Functional testing of the avionics and electrical systems on the test rig (test procedures and result documents creation).

Tutoring

The Master Thesis will be conducted under the supervision of Dr. Giovanni Di Meo, actually Lead Engineer Avionics in MSH, and former PhD in Aerospace Engineering by the Polytechnic University of Turin, with eight years professional experience in the aerospace sector. Expected duration is six months. The results shall be summarized in a report written in English. The necessary infrastructure shall be provided by MSH, and the project will be carried in MSH offices in Wetzikon, where a workshop is also available.