

AEROSPACE ENGINEERING

DIMEAS - Electrified on-board systems for hybrid-electric regional aircraft

Funded By	Dipartimento DIMEAS
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Context of the research activity	<p>In the framework of propulsion system electrification, the aircraft on-board systems need to be electrified increasing the compatibility with the propulsion system and possible synergies. The electrified on-board systems will require a large amounts of electrical power that should be provided by an high voltage high power electrical generation and distribution system. Effect of altitude, electromagnetic compatibility and dynamic loads should be taken into account.</p>
Objectives	<p>The aim of the present research is to develop dynamic models of electrified on-board of an hybrid-electric aircraft. In particular, the activities will be carried out within the HERA (Hybrid Electric Regional Aircraft - Clean Aviation) and Colossus (Horizon Europe) researches focusing on hybrid electric regional aircraft, hybrid electric utility aircraft and full electric urban mobility. The candidate will interact with the main partners of the above mentioned researches (LEONARDO Aircraft Division, Airbus D.S. , German research center - DLR, University of Naples - UNINA, Technical University of Delft - Tu-Delft and others).</p> <p>The candidate will contribute to the electrified on-board systems architectures design and modelling for hybrid electric aircraft. Different systems will be modelled such as the Flight Control System, the Environmental Control System, the Ice Protection System and the other main systems. These models will be defined to calculate the different dynamic loads during the mission. Starting from the dynamic loads it will be possible to size and model the Electric Power Generation and Distribution System. Different power management strategies should be defined to avoid the EPGDS oversizing. Additionally, new technologies will be considered to take into account of thermal, air density and EMC constraints. The systems architecture should be defined considering their RAMS (Reliability Availability Maintainability Safety) requirements. Therefore, the systems have to be defined in terms of Reliability Block Diagrams different for each type of reliability (logistic and mission reliability, safety).</p> <p>The activity will be carried out starting from the models already developed in DIMEAS with proprietary and commercial software.</p>

**Skills and
competencies
for the
development of
the activity**

The candidate should be familiar with the following subjects:

- aircraft on-board system design
- aircraft on-board system modelling
- aircraft design
- aircraft electrification
- RAMS

Moreover, the candidate should be able to interact and collaboratively work with other researchers