Special Session on

Electrical Machines in Aeronautics: Stakes and Opportunities

Organized and co-chaired by:

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Abstract

Aerospace industry, like many others, is facing new challenges regarding the overall efforts in the decarbonation and CO2 reduction. A new era is coming with the investigation of new aircraft concepts and new use cases including for electrical systems, i.e. More Electrical Aircraft (MEA), More Electric Propulsion (MEP) and Hybridization. In such applications, the e-powertrains, composed at least by a power electronics and an electrical machine, are subjected to new requirements beyond the legacy aircraft configurations with mainly an increase in power demand (up to the MW-class) and voltage (up to kilo-Volt DC), while keeping the aeronautics constraints (environment, altitudes, safety…).

In order to propose relevant and competitive products, electrical machine must reach performances beyond the state of the art and thus developments of new technologies are therefore crucial. The main key design drivers are related to specific power (kW/kg), specific torque (N.m/kg) and efficiency (%), which have a direct impact on the overall performances of an aircraft with hybrid or full electric propulsion.

Furthermore, restrictions in the actual supply chain, cost efficiency imperatives, as well as reduction of design margins to reach specifications, require to redefine the relationship between magnetic / electric material properties, there production means, and new design concepts (rare earth-free machine…).

The expected contributions have to be focused on academic or industrial research aiming to illustrate the diversity of investigations to go beyond actual designs and/or production means, and to improve and optimize the overall performances of electrical machine in such industry taking into account the current technical and economic constraints.

Topics have to be related to “conventional technologies” meaning not subjected to cryogenic environment.

Topics of interest include, but are not limited to:

- Topologies for high specific power / high specific torque.
- Material for harsh environments.
- New production means needed for such concepts.
- Relationships / models linking production means, residual material properties and impact on architecture performances.
- Rare Earth-less concepts or use of recycled materials.
- Eco-circular optimized concepts for easy dismantling / recycling.
- Simulations, data-driven models or Artificial Intelligence to improve design exploration, optimization and test cycles (machine and system).
- Reliability evaluations / studies up to the material level of such new concepts.
- Safety and Health-monitoring.

Important dates

- Full Paper Submission: February 1, 2026
- Full Paper Notification: May 1, 2026
- Final Paper Upload: June 1, 2026

Submission of papers

Paper submission follows the rules of regular papers. All the instructions for paper submission are included in the conference website:
https://icem2026.ubi.pt/submission.html