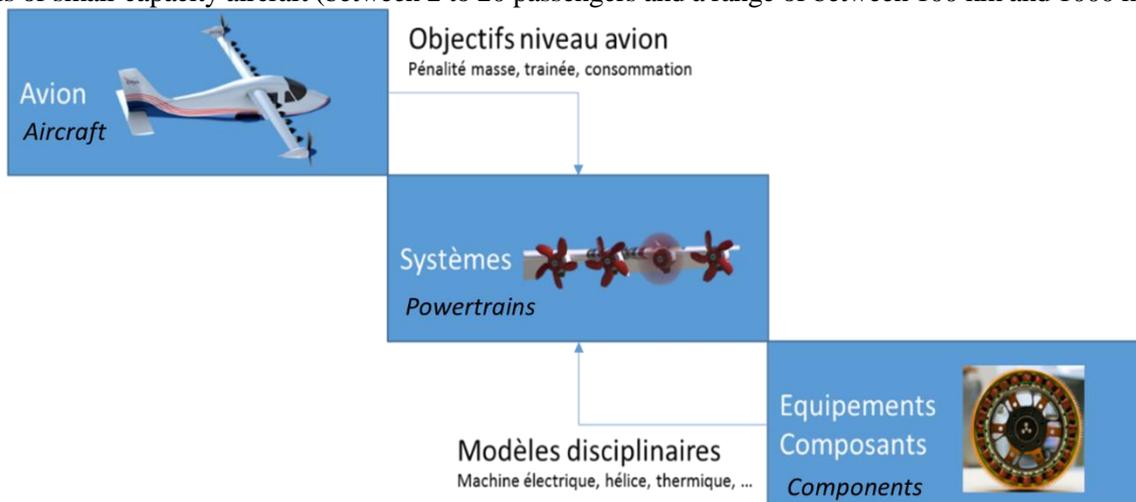


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| Chantier E-AIR | INTERNSHIP 6 MONTHS -YEAR 2020-2021 |
| Internship tutors: ICA, Marc Budinger ISAE, Aurélien Reysset, Scott Delbecq ENAC, Thierry Druot | Location: ICA / ISAE / ENAC - Toulouse Starting Date: February/March 2021 |

Preliminary design of electric powertrains for light aircraft

In the coming decades, air transport will be faced with the biggest change in its history. Despite these difficulties, there are avenues for developing more environmentally friendly aviation. Innovative technologies must be developed in order to manage the energy and power levels required for air transport. The electromechanical propulsion chains in particular make it possible to envisage significant aerodynamic gains. The objective of the internship is to provide models and tools for multidisciplinary optimization of a propulsion system composed of propeller / reducer / motor / cooling corresponding to the needs of small-capacity aircraft (between 2 to 20 passengers and a range of between 100 km and 1000 km).



The main steps of the work are as follows:

1. Bibliographical study on electric motorizations in automobile and aeronautics. Analysis of the configurations of the couplings to the propellers and cooling systems.
2. State of the art and assessment of models for estimating the characteristics of the propellers, motor, reducer, cooling (pump, exchanger, air inlet, profile).
3. Proposal of a generic motor typology to represent a large number of configurations (high / low speed, external / internal cooling).
4. Adaptation of a python control code of FEMM simulations to these typologies
5. Generation of substitution models for evaluating the characteristics of torque, losses, thermal resistance
6. Establishment of an overall Propeller / Motor / Reducer / Cooling sizing code.
7. Optimization according to various criteria (mass, emission), on a given operating point or on mission profile.
8. Generation of lightweight sizing models usable at aircraft level
9. Report and defense

Several academic entities will join in the supervision of this very multidisciplinary internship.

APPLICATION FOR INTERNSHIP

To apply: CV and motivation letter to be send by email to:

ICA, Marc Budinger (mbudinge@insa-toulouse.fr) - ISAE, Scott Delbecq (scott.delbecq@isae-supaero.fr) - ENAC, Thierry Druot (thierry.druot-ext@enac.fr)

For further information: please contact the above-mentioned contacts.