Title: HEAT TRANSFER BETWEEN THE AIRCRAFT ENGINE COMPONENTS AND THE LUBRICATION OIL (A NEW MODEL FOR HEAT REJECTION IN GEAR BOXES)

Problem background
The efficiency of a gear box is strongly dependent on the heat transfer between the elements and the lubricating oil. The models commonly used often don't allow to obtain the desired results accuracy due to the large amount of the parameters and to the complexity of the phenomena that take place during the heat rejection.
For these reason to develop a model that is able to forecast the quantity of heat removed under different engine conditions is the starting point to try to increase the efficiency of a gear box.

Research Project Objectives:
The research program can be divided in the following steps:
• on the basis of the models described in the literature point out all the important parameters able to affect the heat rejection;
• at the beginning only for the take off phase, develop a suitable numerical tool able to simulate all the important parameters/phenomena involved in the heat rejection (e.g. friction, windage, churning, air-oil ratio, etc.) and able to show the effect on the heat transfer due to any change in these parameters;
• model extension in order to examine all the different mission phases and hence the different engine working conditions;
• model validation by using the experimental results available in the literature

Ph.D. themes
• Improvement of the commonly used heat transfer models for the heat rejection into the gear boxes.
• Analyze the influence of the different parameters on the amount of heat removed by oil in the gear box during different mission phases.
• Heat rejection process optimization by changing the previous parameters
• Heat rejection active control

REFERENCE PROFESSOR(S)
Elena Campagnoli, elena.campagnoli@polito.it, +39.011.564.4506, Department of Energetics.
Dario Pastrone, dario.pastrone@polito.it, +39.011.564.4479, Department of Energetics.
INTERNATIONAL AND INDUSTRIAL COOPERATION
AVIO S.p.A.

RESEARCH GROUP
Giuseppe Ruscica, Full Professor
Dario Pastrone, Associate Professor
Lorenzo Casalino, Associate Professor
Elena Campagnoli, Assistant Professor
Andrea M.A. Barbera, Ph.D Student

REFERENCE PAPERS

CONTACTS