Master Thesis - Integration of thermal management system with engine performance model (30 credits/20 weeks – 1-2 student[s])

About us

GKN Aerospace is the world's leading multi-technology tier 1 aerospace supplier. With 33 manufacturing locations in 12 countries, we serve over 90% of the world's aircraft and engine manufacturers. We design and manufacture innovative smart aerospace systems and components. Our technologies are used in aircraft ranging from the most used civil aircraft to the world's advanced 5th generation fighter aircraft and the Ariane orbital rockets used by ESA.

Project Background

As the complexity of modern aeroengines increases, the need for integrated modelling of the engine and its supporting subsystems becomes more important. One such subsystem is the Thermal Management System (TMS), which manages the growing heat loads associated with advanced engine architectures and increased electrification. Since the behavior of the engine affects the TMS, and the TMS influences engine operating conditions, the two systems are closely coupled. Co-simulation of engine and thermal management models enables these interactions to be captured more accurately, improving predictions of temperatures, heat loads, and overall system performance. Conventional aircraft thermal management utilizes fuel, oil, and air as cooling media to remove heat from engine and aircraft systems. However, the available heat sink capacity is becoming increasingly constrained as thermal loads grow. While effective for conventional aircraft, increasing electrification and thermal loads are driving the need for more advanced thermal management solutions. One promising technology is the Vapor Compression System (VCS), which uses a refrigerant cycle to actively transport heat. Compared to conventional cooling methods, a VCS can provide greater cooling capacity, reduce bleed air requirements, and improve overall engine efficiency.

Assignment Description

This thesis aim is to develop an integrated composite model constituted of an engine performance model and a model of the thermal management system. This composite model would then be used to evaluate the impact of the engine and TMS models on each other when run in design and off-design. The project plan is expected to be:

- Literature review
- Familiarization with NPSS and GKNs engine performance models
- Development of thermal management system in AmeSim
- Creation of software independent formats for the engine and TMS model
- Integration of the models in a composite model
- Evaluation of the composite model in design and off-design
- Document and present the work

Qualifications

- Final year master's student in Aeronautical, Mechanical, Physics Engineering or similar
- Knowledge in jet engine / gas turbine performance and turbomachinery
- Programming (C++/python)
- Good understanding of and interest in thermodynamics, heat transfer, and fluid mechanics.

Apply by

Send your resume and cover letter to august.skoglund@gknaerospace.com.

Last date for application: 2026-11-15. Applications are reviewed on a rolling basis.