# Master Thesis - "Aircraft Mission Analysis in NPSS"
(30 credits/20 weeks – 1 to 2 students)

About us

GKN Aerospace is the world's leading multi-technology tier 1 aerospace supplier. With 55 manufacturing locations in 15 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

Aircraft mission analysis is performed in the early stages of an aircraft design process in order to determine its scale by estimating the takeoff weight (W_{TO}). Together with a predefined mission and aircraft performance requirements, engine performance data at every mission point and preliminary design values of takeoff thrust loading (T_{SL}/W_{TO}) and wing loading (W_{TO}/S), this analysis calculates the aircraft weight throughout the mission segments and compiles a total takeoff weight and the fuel consumption.
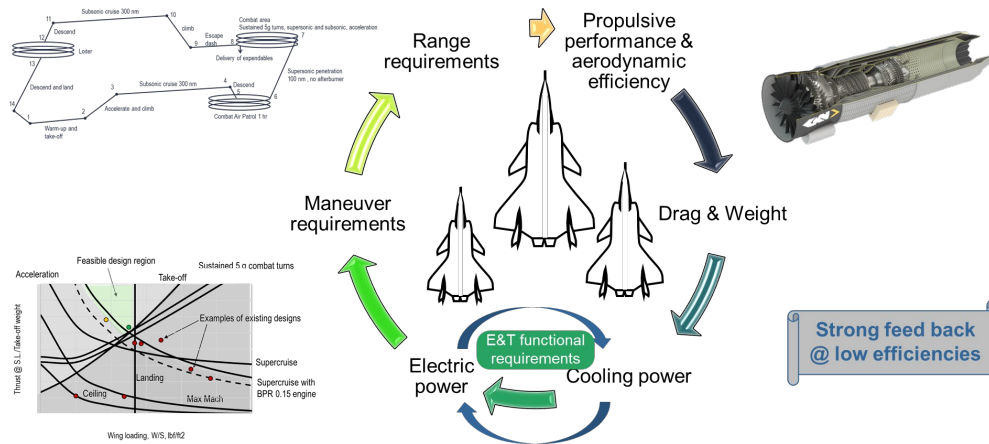
Figur 1: Overview of aircraft engine design loop with constraints & mission analyses

There is a need to be able to perform this type of analysis effectively and with certainty within the work of future engine concepts since the mission plays an important role in defining the engine cycle. Currently, engine performance models are used in an iterative process to produce input data for the analysis. In order to improve upon this method, it is desired to develop and optimize a method in to couple the mission analysis and engine performance model.

NPSS (Numerical Propulsion System Simulation), which will be used for this project, is an advanced object-oriented, non-linear thermodynamic modeling environment used by the aerospace industry for modeling turbomachinery, air-breathing propulsion systems, liquid rocket engines, engine control systems, and system model integration.

Assignment Description

The aim of this Master Thesis is to develop and optimize a method for performing aircraft mission analysis by the use of NPSS and engine performance models.

Milestones and content

The following project milestones are suggested:

1. A literature study to identify similar work reported and to acquire understanding of the topic and how methods may be implemented
2. Use NPSS together with existing inhouse scripts to develop and optimize a method for performing aircraft mission analysis
3. Perform the mission analysis for a predefined mission and set of aircraft requirments/constraints and evaluate the results
4. Construct additional aircraft missions and evaluate the method and results for these missions
5. Thesis report including background, description of tasks, targets and methods, suggestions for future work, list of scripts etc. created during work

Qualifications

- Bachelor/Master's in Applied Mechanics, Engineering Physics or other relevant field
- Basic knowledge in gas turbine theory preferred
- Object-oriented programming skills meriting but not required

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Send your resume and cover letter to:

Patrick Nilsson, Team Lead Performance
E-mail: Patrick.Nilsson@gknaerospace.com
Phone: +46520216971

Interviews will be held continuously.