

# Characteristics of the Specific Fuel Consumption for Jet Engines

Task for a *Project*

## Background

The Specific Fuel Consumption (SFC) of a jet engine  $c$  is defined per thrust and called more precisely also Thrust-specific Fuel Consumption (TSFC). This common definition comes from the fact that thrust (and not power) is measured on jet engine test stands. Engine efficiency is however related to power. It follows from first principles that  $c$  must depend on the speed of the aircraft  $V$  (or Mach number). The most simple representation of this is a linear function  $c = c_a \cdot V + c_b$ . Other operating conditions that have an influence on TSFC are thrust (equal to aircraft drag in unaccelerated horizontal cruise flight) as well as all parameters that depend on flight altitude (air temperature, pressure, density, speed of sound). Some of these parameters are included in a model by HERRMANN, which unfortunately does not account for thrust.

## Task

The task of this project is to investigate TSFC dependencies especially with respect of thrust. Following subtasks have to be considered:

- Explain the principles of specific fuel consumption. Investigate TSFC dependency on speed and on altitude.
- Do a literature review of models for the estimation of TSFC dependency on thrust.
- Do a literature review of data sources providing TSFC dependency on thrust.
- Analyze the data and find a way to estimate the influence of thrust on TSFC.
- Evaluate the importance of including the thrust dependency on TSFC in calculations.
- Re-evaluate the optimum speed for the maximum range with the investigated TSFC dependencies and compare the result with the "classically" taught optimum aircraft speed.

The report has to be written in English based on German or international standards on report writing.