

# **Design of a Modern Passenger Aircraft with Diesel Engine and Propeller**

Task for a *Project* (Master studies)

## **Background**

Starting point for this project is the [TV Documentary](#) from 2022 and the related [Press Release](#) by Steinhausen and Scholz titled "Flying with Diesel Engine and Propeller". Accordingly, diesel engines may have a higher efficiency than other engine types. Propeller aircraft benefit from their high propulsive efficiency. Drag of propeller aircraft may be lower due to their lower cruise speed. Lower fuel burn and lower flight altitude may lead to lower equivalent CO<sub>2</sub> emissions. Nevertheless, diesel engines with propeller may not be better than turboprops, when their overall efficiency is compared ([Mahfouz 2023](#)). Part of the comparison with conventional passenger jets are also maintenance costs and the purchase price (which determines depreciation). Diesel engines are in use and have been used in aviation before. As such, their introduction should cause less problems than other proposed new technologies based e. g. on hydrogen or batteries. Much information is available to solve the task: A redesign of the Airbus A320 as well as various Excel tables for preliminary sizing and optimization of jet and propeller driven passenger aircraft.

## **Task**

Based on the Top Level Aircraft Requirements (TLARs) of the A320 or A320neo a turboprop aircraft should be designed and in a second step an aircraft with diesel engines and propeller. The following subtasks should be considered:

- Short review and background: Diesel engines and propellers.
- Redesign of the A320 (turboprop engines).
- Preliminary sizing of an aircraft with A320 TLARs with turboprop engines.
- Preliminary sizing of an aircraft with A320 TLARs with diesel engine and propellers.
- Comparison of the three aircraft designs.
- Preliminary sizing of all three aircraft with reduced range.
- Discussion of the results and evaluation of the diesel concept.

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