

Preliminary Sizing of Propeller Aircraft (Part 25)

Task for a Project

Background

The Aircraft Design and Systems Group (AERO) developed a preliminary sizing tool for propeller driven aircraft (PreSTo-Classic-Prop). This is based on a preliminary sizing tool for Part 25 jets (PreSTo-Classic). All the tools are implemented with Excel. When adapting the tool from jets to propeller driven aircraft, an estimation of the propeller efficiency is needed. Methods were proposed in the group's previous research work and in the literature. Furthermore, AERO had developed an optimization tool for Simple Aircraft Sizing and Optimization (SAS) as a simplification of the PhD-level tool OPerA for jets (which is based on the PreSTo suit): SAS-Part25-Jet is openly available and used by students. The PhD-level tool PrOPerA was derived from OPerA and PreSTo-Classic-Prop and simplified to SAS-Part25-Prop, but it is so far not available Open Access.

Task

The first task of this project is to improve PreSTo-Classic-Prop such that the propeller efficiency calculation is automated. Further modification should make the tool more user-friendly. PreSTo-Classic-Prop should be evaluated by the redesign of a large propeller driven aircraft. The second task is to prepare SAS-Prop for Open Access. A layout similar to SAS-Part25-Jet should provide a user-friendly tool also for props.

The subtasks are:

- Implementation of propeller efficiency calculation methods to improve PreSTo-Classic-Prop
- Improvement of the usability of PreSTo-Classic-Prop
- Evaluation of the implementations by a redesign of the ATR 72-600
- Improvement of the user interface of SAS-Part25-Prop

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