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Comparative study of advanced turboprop aircraft with wing and rear mounted propulsion system in the AGILE EU project

Artur Mirzoyan[1] and Alik Isyanov[2]
Central Institute of Aviation Motors, Moscow, Russia,

Cerino Giovanni[3]
LEONARDO, Aircraft Division, Naples, Italy

Pierluigi Della Vecchia[4], Luca Stingo[5]
University of Naples Federico II, Naples, Italy

Marco Fioriti[6], Luca Boggero[7], Francesca Tomasella[8]
Politecnico di Torino, Turin, Italy

and
Prajwal Shiva Prakasha [9]
German Aerospace Center, Hamburg, Germany

The present paper describes the comparison of two variant of the same regional turboprop aircraft using the AGILE's collaborative MDO process. The two turboprop aircraft are both characterized by the same Top Level Aircraft Requirements, but with a different engine positions. The requirements are provided by the industrial partner (Leonardo – Aircraft Division) leading to two aircraft configurations with wing and rear mounted propulsion system. A complete aircraft preliminary design is carried out to understand the effect of engine position considering all the main design disciplines. 13 engine design cases related to different flight conditions and engine ratings are considered to select engine cycle and size. Baseline engine size is defined by high shaft power requirements at max continuous conditions and by power and thrust requirement at other design cases. Improvement of cruise installed SFC of baseline engine by 6-7% is shown to reach given preliminary requirement on cruise SFC level. The results of the two aircraft are obtained and compared, showing that the rear mounted engine configuration can reach higher cruise speeds, despite slight increments of on-board systems weight and required mission fuel.

[1] Head of Research Group, CIAM, 2, Aviamotornays Str., Moscow, 111116, AIAA Member.
[2] Head of Department, CIAM, 2, Aviamotornays Str., Moscow, 111116, AIAA Member .
[3] Civil transport aircraft preliminary design coordinator, Leonardo – Aircraft Division, Pomigliano D'Arco (NA), Italy.
[4] Assistant Professor, Industrial Engineering, Aerospace Division, Via Claudio 21, 80125, Naples, Italy, AIAA Member.
[5] PhD Student, Industrial Engineering, Aerospace Division, Via Claudio 21, 80125, Naples, Italy, AIAA Member.
[6] Assistant Professor, Mechanical and Aerospace Engineering Department, Politecnico di Torino, Corso Duca degli Abruzzi 24, 10129, Turin, Italy, AIAA Member.
[7] Post-doc Fellow, Mechanical and Aerospace Engineering Department, Politecnico di Torino, Corso Duca degli Abruzzi 24, 10129, Turin, Italy, AIAA Member.
[8] Research Fellow, Mechanical and Aerospace Engineering Department, Politecnico di Torino, Corso Duca degli Abruzzi 24, 10129, Turin, Italy, AIAA Member.
[9] Research Scientist, German Aerospace Center (DLR), Hein-Saß-Weg 22, 21129 Hamburg, AIAA Member