



A Java Toolchain of Programs for Aircraft Design

*Agostino De Marco,
Assistant professor*

*Department of Industrial Engineering (DII) – University of Naples "Federico II"
Via Claudio 21, 80125 Napoli - ITALY
E-mail: agodemar@unina.it*

*Vincenzo Cusati,
PhD Student*

*Department of Industrial Engineering (DII) – University of Naples "Federico II"
E-mail: vincenzo.cusati@gmail.com*

*Vittorio Trifari,
PhD Student*

Department of Industrial Engineering (DII) – University of Naples "Federico II"

*Manuela Ruocco,
PhD Student*

Department of Industrial Engineering (DII) – University of Naples "Federico II"

*Fabrizio Nicolosi,
Associate professor*

Department of Industrial Engineering (DII) – University of Naples "Federico II"

*Pierluigi Della Vecchia
Assistant professor*

Department of Industrial Engineering (DII) – University of Naples "Federico II"

ABSTRACT

The purpose of this work is to provide a comprehensive overview of JPAD (Java toolchain of Programs for Aircraft Design), a java-based framework conceived as a fast and efficient tool useful as support in the preliminary design phases of an aircraft, and during its optimization process. The software platform is made to perform fast multi-disciplinary analysis of an established aircraft configuration and to search for an optimized configuration in a domain, whose boundaries are defined by the user. The following sections will focus on the description of the software structure and on the results obtained from a case study carried out assuming as baseline a regional turboprop aircraft model similar to ATR-72.

KEYWORDS: AIRCRAFT DESIGN, SOFTWARE ENGINEERING, JAVA

NOMENCLATURE

Latin

AEA – Association of European Airlines
AEO – All Engines Operative
ATA – Air Transportation Association of America
BFL – Balanced Field Length
DAF – Design of Aircraft and Flight technologies research group
ECAC – European Civil Aviation Conference
 C_L – Lifting coefficient
DOC – Direct Operating Costs
FAR - Federal Aviation Regulations
GUI – Graphical user interface
ICAO – International Civil Aviation Organization
JPAD – Java toolchain of Programs for Aircraft Design

M – Mach number
MTOW – Maximum Take-Off Weight
OEI – One Engine Inoperative
OEW – Operating Empty Weight
 Re – Reynolds number
T/W – Thrust ratio
TNAC – Transport Aircraft Noise Classification Group
 V – Aircraft speed
W/S – Wing loading
XML - eXtensible Markup Language
XLS – Excel file format

Greek

α_b – angle of attack in body reference frame
 α_w – angle of attack of the wing in local reference frame