IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Small Launchers: Concepts and Operations (Part I) (7)

Author: Mr. Nicolas Bérend
ONERA - The French Aerospace Lab, France

Mr. brieuc danet
ONERA - The French Aerospace Lab, France
Mrs. Julie Gauvrit-Ledogar
ONERA - The French Aerospace Lab, France
Mrs. Françoise Perrel
Centre National d'Etudes Spatiales (CNES), France
Mr. CEDRIC DUPONT
Bertin Technologies, France
Mr. Eduard Diez
GTD, Spain
Dr. Giulio Molinari
ETHZ, Switzerland
Mr. Diego Giuseppe Romano
Piaggio Aero Industries SPA, Italy
Mr. Bastien Haemmerli
Nammo Raufoss, Norway
Mr. Tim Searle
SpaceTec Partners, Belgium

ALTAIR INNOVATIVE AIR-LAUNCH SYSTEM – CONSOLIDATED DESIGN, LESSONS LEARNED AND PERSPECTIVE

Abstract

As an answer to Europe's need of an independent access to space for small satellites, for which the market is expected to grow, the ALTAIR project (Air Launch space Transportation using an Automated aircraft and an Innovative Rocket) has been launched in the frame of the European Union's Horizon 2020 research innovation program. The project, which is currently in its third and last year, aims at demonstrating the economic and technical viability of an innovative air-launch system whose carrier is a reusable automated aircraft designed specifically for the launch mission. The reference target mission is the launch of the 150 kg total payload weight into a Sun-Synchronous target orbit. The paper presents the main projects results, lessons learned and perspective. In the first part of the paper, we present the project's objectives, organization and methodology. The objective of cost reduction, which is of paramount importance in the project, is achieved through the use of Multidisciplinary Design Optimization (MDO) approach and appropriate system and technology choices. The second part of the paper is devoted to the technical results of the study, along with cost analysis elements. We present the consolidated design of the ALTAIR system, made of a reusable unmanned carrier, an expendable rocket using hybrid propulsion for the main stages and a ground system. We also present the preliminary analysis of the results the flight experiments performed with the small scale EOLE demonstrator, which are focused of the carrier/launcher release and the innovative launcher avionics system. In the third part of the paper, we present the outline

of ALTAIR's business plan and market analysis results. Finally, we present the development roadmap towards of an operational ALTAIR launch system.