IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Upper Stages, Space Transfer, Entry & Landing Systems (3)

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SPACE RIDER MISSION ENGINEERING: CURRENT STATUS IN SUPPORT OF CRITICAL DESIGN REVIEW ASSESSMENT

Abstract

In December 2020, ESA signed contracts with co-prime contractors Thales Alenia Space and Avio for delivery of the Space Rider flight model respectively for the re-entry module (RM) and the Service Module (SM) constituting the whole SRS. The ESA Space Rider program will provide Europe with an affordable, independent, reusable end-to-end integrated space transportation system specifically designed for routine access and return from low Earth orbit. It will be used to transport payloads for an array of applications, orbit altitudes and inclinations. The Space Rider can operate in orbit for up to two months and is composed of an expendable AVUM Orbital Module (AOM) and a reusable Reentry Module (RM), which shall fly a minimum of six times and will make use of a guided parafoil system to perform a soft and safe landing. For the RM this translates into the need for a flexible and robust system, able to cope with a wide range of flight conditions and mission requirements, in compliance with stringent safety constraints in case of failure. This is a critical additional challenge for Europe that aims at advancing the current state of the art in re-entry technology represented by the successful flight of the ESA IXV (Intermediate eXperimental Vehicle) in 2015. This paper presents the current status of the Space Rider Mission and the Mission Engineering results achieved by DEIMOS Space in support of the system Critical Design Review (CDR). The Mission Engineering is a design process in support of the system definition that merges the needs and constraints from the several subsystems into a feasible mission solution. The latter is defined by flying qualities aspects, end-to-end (de-orbiting to touchdown) reference trajectories, sizing trajectories for subsystems specifications, assessment of the mission performance through Monte Carlo simulation campaigns, and safety analyses.