

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Future Space Transportation Systems Verification and In-Flight Experimentation (6)

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CIRA USV3 AND THE ITALIAN CONTRIBUTION TO EUROPEAN RE-ENTRY CAPABILITIES
AND EXPECTATIONS

Abstract

Considering the successful flights of the European VEGA launcher and the IXV re-entry vehicle, Europe is ready to set up the next step in the frame of PRIDE program. Looking to a fully reusable spaceplane in a longer timeframe, another step is needed to cover the reusability attribute, in-orbit operability and runway landing capability. The Italian Aerospace Research Centre, in the framework of the national space program has carried out in the last decade studies on the USV winged re-entry spacecraft. Beside the design and in-flight experience gained in transonic-subsonic regime, in the last four years studies on a small scale re-entry vehicle called USV3 with conventional landing capability have been performed. The system shall be put in LEO orbit by the VEGA and shall perform scientific and technological experiments in orbit before re-entry. After de-boost the vehicle shall execute an autonomous reentry flight from hypersonic to subsonic regimes allowing terminal area energy maneuvering, approach and landing on conventional runways. The USV3 concept is deemed by CIRA to be one of the possible candidates for the PRIDE program objectives. Comparing to the excellent results of IXV design, some system aspects may introduce the need for the acquisition of new enabling technologies: wings including TPS and actuation chains are needed to cover supersonic, transonic and subsonic flight up to landing together with suitable GNC approach capable to manage the autonomous flight from space to ground. A first issue of reduced curvature radius of wings with TPS must be addressed. Alternative structural concepts based on composite anisogrid structure to reduce the vehicle weight are under investigation. Compact and lightweight foldable Landing Gear system is also a target. The present paper describes the program evolution to integrate the Italian vision on re-entry technologies and systems with the PRIDE high level objectives.