

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

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THE ADVANCED RE-ENTRY VEHICLE - A STEP TOWARD THE EUROPEAN AUTONOMOUS
HUMAN ACCESS TO SPACE

Abstract

Europe has considered undertaking autonomous human spaceflight capabilities since the 80's, following the initial successes of the NASA Space Shuttle flights. The Hermes space-plane development aimed at such an advanced capability based on the new Ariane 5 launcher, which was planned for both unmanned launches and human space flights. In the subsequent years, a series of alternative configurations for lower cost re-entry vehicles were analyzed. Finally a classic conical capsule was selected as the most promising configuration and substantial work was conducted for the preliminary definition of a crew transportation system, based upon such a capsule and the parallel on-going developments of the Ariane 5 launcher and the ATV orbital propulsion module.

Nowadays the situation has considerably evolved with:

- the significant reliability and mission rate of Ariane 5
- the first mission of the ATV Jules Verne having been accomplished in early 2008 with full success;
- the successful deployment and commissioning of the Columbus orbital laboratory and of major elements of the ISS as the Nodes and Cupola;

proving the maturity achieved by the European space infrastructure technologies. Building on this experience, Europe, through ESA, has the opportunity to proceed with the next stage in human spaceflight by acquiring crew transportation capability and maintaining and enhancing an experienced astronaut corps to ensure continued presence in space and increased experience in operations of human spaceflight systems.

A stepped-approach for a European space transportation system development has been selected, starting with the implementation of an Advanced Re-entry Vehicle (ARV) cargo transportation capability, with the objective of being used for ISS cargo upload and download in support of ISS operations beyond 2015. Such system would increase the robustness of the ISS Exploitation for the benefit of all partners. An evolved ARV crew transportation version could become available beyond 2020, allowing initial flight testing at the ISS.

The above aspects are the object of an industrial contract for a phase A of the ARV under the lead of Astrium ST GmbH, European Prime Contractor for the program. ARV Phase A started in 2009 and foresees a preliminary design iteration for the ARV crew vehicle (to derive requirements for the Re-entry Module parts common to the two vehicle versions) and design / development activities for the ARV cargo

up to mid 2011, including the performance of major milestones as the System Requirements Review in 2010 and the System Concept Preliminary Review in 2011.