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STUDY ON HTV EVOLVED PAYLOAD RECOVERY SYSTEM

Abstract

The H-II Transfer Vehicle (HTV) is the Japanese unmanned spacecraft that delivers supply cargo to the International Space Station (ISS) and it is launched by the H-IIB rocket from the Tanegashima Space Center. The HTV delivers up to 6,000 kg of cargo, both pressurized and unpressurized, to the ISS. The maiden flight "HTV1" mission has been completed successfully in November 2nd, 2009 with destructive reentry to the south Pacific as planned.

With the completion of HTV development, the international fleet to support the ISS logistics and crew transfer is now complete. However, the retirement of the US Space Shuttle, which is planned in 2010, will reduce the capability greatly, especially in terms of payload recovery back down to earth. Russian Soyuz will be the only spacecraft for such recovery, but its capability of payload recovery is small. Hence, NASA is considering to somewhat compensate with such decrease by COTS program, however, it may not be enough to cover the capability of the Space Shuttle. Furthermore, considering that the ISS utilization for experiments may increase as ISS starts the fully practical operation with its final build up configuration, demands to recovery cargo may increase significantly. Therefore, to meet the growing demand for a recovery spacecraft, a reentry capsule is studied in Japan, since 2004. As with ESA, which is studying an ATV evolved capsule or Advance Recovery Vehicle (ARV), the reentry capsule studied in Japan is a evolved version of the HTV or HTV evolved payload Recovery system (HTV-R). This approach can effectively utilize the resource obtained through the HTV development.

This paper describes the results of conceptual study for HTV-R. The study include the selection of configuration, such as trade study on whether to replace the pressurized module of the HTV or unpressurized carrier or both. Such trade study has been conducted in terms of up and down cargo mass capability, development cost and risk, etc. And, in order to effectively utilize the outcome of the successful development of HTV, most of the orbital maneuver shall be the same as current HTV, therefore the development cost and major risks on near ISS operation can be reduced. Furthermore, for the vehicle configuration selected, each subsystem configuration, equipment design and operation plan are discussed. A basic concept of HTV-R is proposed through these studies. We plan to further study on such system in order to contribute to ISS.