SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS (D2)
Future Space Transportation Systems (4)

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EVOLVING PLAN OF JAPANESE PRIMARY LAUNCH SYSTEM

Abstract

This paper presents our current evolving plan for the next primary launch system succeeding to H-IIA/B.

The Japanese new heavy launcher, H-IIB, achieved a successful maiden flight carrying H-II Transfer Vehicle (HTV) in 2009 while our primary launcher, H-IIA, has been continuing successful launches for the 10th times in a row. Now that we obtained a heavy launcher and a transfer vehicle in addition to the workhorse middle size launcher, we are coming up as one of the leading countries in space development from the technical viewpoint. While we will keep operating H-IIA/B family, we have started preparing an advanced solution for Japanese future space transportation to boost space activities.

In the field of national space policy, the Japanese space basic law was enacted in 2008 and the basic plan was approved in 2009. The basic plan prescribes two major demands for the next primary launcher; 1) to cover broader range of payload from domestic satellites for science and observation through commercial satellites, 2) to have technological capability to evolve into human transportation.

We are considering a step-by-step (block upgrade) approach while keeping commonality at each step to avoid excessive risk and cost for development, since we need to keep operating the primary launch system in order to respond to the national launch demand.

At the first step of our current plan, we will improve second stage to enlarge mission variety. The crucial technologies are those for long coasting of second stage and deep throttling of its engine. These technologies can lead to reduction of required delta V of satellites for GSO insertion and to multiple launches for SSO in different altitudes.

At the second step, we will develop a new standard launcher that has a simple configuration of two liquid stages without solid boosters for its basic configuration to realize high reliability with cost-effectiveness. Although this configuration requires its first stage thrust to be higher than current LE-7A, solution can be made through engine clustering technique obtained through H-IIB development. In addition, we have started the RD of a next generation engine with higher thrust and robustness, dubbed LE-X.

At the next step, we will obtain a heavy launcher to meet future demands for larger robotic lunar exploration and human space flight. This launcher will be realized by clustering the liquid booster developed at the second step, which will have large advantages on manufacturing and risk reduction.