

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Small Launchers: Concepts and Operations (7)

Author: Prof. Yasuhiro Morita

Japan Aerospace Exploration Agency (JAXA), ISAS, Japan, morita.yasuhiro@jaxa.jp

Mr. Ryoma Yamashiro

Japan Aerospace Exploration Agency (JAXA), Japan, yamashiro.ryoma@jaxa.jp

Mr. Takayuki Imoto

Japan Aerospace Exploration Agency (JAXA), Japan, imoto.takayuki@jaxa.jp

Dr. Shinichiro Tokudome

Japan Aerospace Exploration Agency (JAXA), Japan, tome@isas.jaxa.jp

Mr. Koichi Okita

Japan Aerospace Exploration Agency (JAXA), Japan, okita.koichi@jaxa.jp

Mr. Yasuhiro Saito

Japan Aerospace Exploration Agency (JAXA), Japan, saitoh.yasuhiro@jaxa.jp

THE FURTHER EVOLUTION PLAN OF JAPAN'S EPSILON LAUNCH VEHICLE

Abstract

The Epsilon launch vehicle, the newest version of Japan's solid propulsion rocket, had its maiden flight in September of 2013 and successfully deployed the extreme ultra-violet planetary telescope satellite "Hisaki". It should be emphasized that the JAXA appreciates the advantages of combined power of the standardized small satellites and the Epsilon's highly efficient launch system, both developed by JAXA, to increase the level of space activities. In addition, the launch site of the Epsilon rocket remains to be the Uchinoura Space Center (USC), which is the home of Japan's solid propulsion rockets. Although it is already a highly compact launch complex, modifications were made to transform it to become more efficient. The efficient launch vehicle and the compact USC will establish one of the most powerful tools that contribute to small missions (maximum 1.2 ton into LEO and 450kg into SSO as of the first flight). The purpose of the Epsilon rocket is to provide small satellites with a responsive launching, which means a low cost, user friendly and ultimately efficient launch system. To realize this, the design concept of the Epsilon involves various innovative next generation technologies such as the highly intelligent autonomous checkout system and the mobile launch control. Owing to these endeavors, the launch control can be executed using only a couple of PCs. Another aspect that small satellites will most welcome is more user-friendly character including: a reduction in the acoustic vibration level by modified ground facilities; an attenuation of the sinusoidal vibration environment by a special vibration attenuator; and a high orbit injection accuracy by a liquid propelled upper stage. Now that the first flight was successfully finished, the most important is what the next step will be in the future. JAXA has been conducting intensive researches on a next generation Epsilon to launch a more powerful and lower cost version Epsilon (E1). In order to minimize the level of technical risks, JAXA plans to take a step by step approach to improve the cost and performance of the launch system toward E1. The second flight will be conducted in 2015 with an enhanced launch capacity of more than 500kg into SSO (20