

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

Author: Dr. Rolf Janovsky
OHB System AG-Bremen, Germany, Rolf.janovsky@ohb-system.de

Dr. Farid Gamgami
OHB System AG, Germany, Farid.Gamgami@ohb.de
Mr. Piotr Perczynski
OHB System AG, Germany, pperczynski@gmail.com
Mr. Marc Scheper
OHB System AG-Bremen, Germany, marc.scheper@ohb.de
Mr. Niklas Voigt
OHB System AG-Bremen, Germany, niklas.voigt@ohb.de
Mr. Robert Ernst
OHB System AG-Bremen, Germany, robert.ernst@ohb.de
Mr. Sascha Larch
MT Aerospace AG, Germany, sascha.larch@mt-aerospace.de
Mr. Floriano Venditti
OHB Italia SpA, Italy, fvenditti@cgspace.it
Mr. Ghislain Ruy
LuxSpace Sarl, Luxembourg , ruy@luxspace.lu

ADVANCED LAUNCHER CONCEPTS FOR A FUTURE MARKET – AN ANALYSIS

Abstract

The spectrum of launch vehicles in development as well as new ideas and concepts had a remarkable growth in the recent years. New ideas and concepts are discussed world-wide and new players show up. This development seems to be pushed also by a satellite launch market, which expands more and more into purely commercially operated domains, which in turn foster also new ideas regarding access to space. Within this paper, the content and results of an internal study done in 2015 on new launch vehicle concepts are presented. This study aimed to do a fresh look on the future space transportation market in the years 2030+ and to identify suitable launch vehicle concepts, which can be commercially successful in this future market. For this purpose, a review of the forecasted satellite market for all relevant mission- and payload-ranges, as well as an analysis of the expected launch vehicle competitor situation was done. This was the basis for the definition of four Design Reference Missions (DRMs), covering the full spectrum, from a 7 tons payload into a GTO down to a 350 kg payload into a 700 km-SSO. Based on the market analysis and the expected, for each DRM a number expected launches per year to be captured by the new launch vehicle concepts was identified. For all four DRMs, new launch vehicle concepts capable to satisfy the mission and system requirements in each class were identified. In total, nine different launch vehicle concepts were defined, conceptually designed and technical and programmatic data files prepared. These concepts cover a broad spectrum, from a fully expendable two-stage-to-orbit vertical take-off system for a heavy GTO-payload, various air-launched concepts, a re-usable single-stage-to-orbit vehicle down to a micro-launcher. Based on the overarching goal of the study, to define launch vehicle concepts which are commercially successful and attractive for investors, in total 16 weighted criteria in four groups were defined to assess and rank the different launch vehicle concepts. At the end of the study, three launch

vehicle concepts were identified as winners, of which one was capable to win in two DRM-categories. The winning concepts are now subject to a second study phase with a more detailed analysis of their technical and programmatic feasibility.