SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Launch Vehicles in Service or in Development (1)

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VEGA LAUNCH VEHICLE QUALIFICATION PROCESS: FROM HWIL TESTING TO MODELS AND DATA REFINEMENT THROUGH PFA

Abstract

VEGA is the new small European Launch Vehicle (LV) designed to cope with a wide range of missions and payload (PL) configurations, from single satellite up to main-plus-six-micro-satellites missions. Compatible PL masses range from 300 kg to 2500 kg, depending on the type and altitude of the required orbit. VEGA has been designed as a single body launcher with three solid-propelled stages and an additional liquid-propelled upper module used for both attitude and orbit control as well as satellite release. The fully successful maiden Qualification Flight (QF) dated 13th February 2012 resulted from a deep pre-flight analysis, mainly oriented at achieving a robust LV. The present paper is aimed at providing a technical overview of the LV qualification process final steps. In particular:

- with data and models (sub-systems as well as realistic disturbs scenario which the LV can face during different flight phases), all defined through the LV configuration development, a set of Worst Cases (WC) are properly defined. These are addressed at being tested within HWIL simulation campaigns to verify the proper behavior of GNC algorithms implemented within the Flight Program Software (FPS);

- following QF telemetry acquisition, a level-0 Post Flight Analysis (PFA) is performed. Resulting output is detailed exploited in order to refine 6DOF LV simulator adopted mathematical models and data. Such a refinement is of strong interest since an improved capability in real LV behavior prediction reflects in prediction reliability within phases characterized by a loss in telemetry data during the acquisition process.