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DESIGN CONSOLIDATION AND QUALIFICATION OF THE UHETSAT MICROSATELLITE

Abstract

The uHETSat satellite is the second platform of SITAEL's S-75 fleet (microsatellite class) following the launch of ESEO in December 2018. The spacecraft is designed to equip and operate a Hall Effect thruster-based micro-propulsion system internally developed by the company in the frame of a dedicated IOD-IOV mission. The uHETSat platform completed its own environmental qualification both at unit (EQM, Engineering Qualification Models) and system (SM, Structural Model) level following the delta-design of the previous ESEO equipment, required to match the more demanding mission requirement (increased lifetime and platform reliability above all) and at the same time to implement the ESEO's lessons learnt during one year and a half of in-orbit experience. Upon completion of the environmental qualification, each uHETSat platform unit has been integrated in the satellite flatsat, which is setup to perform all the operating scenario test and simulation in view of the final integration. In parallel, all the payload units have been also qualified and assembled to assess the capability of the entire micro-propulsion system to operate in the harsh operating environment. This paper focuses on the two major tasks achieved in preparation of the integration of the flight model:

- The implementation of the ESEO Lessons learnt, based upon the experience gained in the frame of the acceptance test campaign of the flight item and dealing mainly with the structural and thermal improvement implemented in the uHETSat design to achieve the payloads goal. Such activities included the optimization of the interfaces (both mechanical and thermal) between the structural elements and the improvement of the RF antenna system.
- The qualification philosophy proposed at unit level and consolidated in its later stage at system level through the environmental test campaign. A focus is given to the qualification of the structural model and to the definition of the mechanical loads environment as agreed with the launch provider. The uHETSat model philosophy presented at the end of the paper shows the smart approach presented to the customer to compress the schedule, reducing the missionization time and costs in line with the paradigms of the upcoming new space economy.