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Title

Development and Qualification of the Avionic Support Structure of the Ariane 6 Upper Liquid Propulsion Module

Authors

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Abstract

Targeted for an inaugural launch in 2023, Ariane 6 will be the launcher work horse for future European access to space. ArianeGroup (AG) is the Launcher prime contractor and integrator, with ArianeGroup Bremen being responsible for development and integration of the A6xUpper Stage, the so-called Upper Liquid Propulsion Module (ULPM). Within this ULPM development perimeter, AG BRE is also contributing a significant number of so-called “own parts”, i.e. elements / components developed and qualified in-house. Amongst those are the integrated cable-duct or “Raceway”, the non-cryogenic lines, as well as the support structures that house the Launcher on-board electronics, the so-called Avionic Support Structures (AvSSs). Placed in between the ULPM Liquid Hydrogen (LH2) and Liquid Oxygen (LOX) tanks, attached to the ULPM Inter-Tank Structure (U-ITS) in a technically challenging location due to its very cold environment, the AvSS’ main function is - throughout the entire launcher mission - to provide a cosy environment to the avionics equipment (including the Inertial Measurement Unit (IMU) as a main contributor to Guidance, Navigation and Control (GNC) functions), keeping the equipments within their required temperature range, as well as within their limits regarding mechanical loads (static and dynamic accelerations, acoustic loads, shock). This paper gives a comprehensive overview on the development of the AvSS with a focus on qualification activities, in particular justifications achieved by tests, from component (e.g. dampers, thermal control hardware) to sub-system level (e.g. AvSS dynamic testing, AvSS thermal vacuum test), as well as system tests like the Launcher Combined Test (CT) campaign in French Guyana and the combined ITS / AvSS Modal Test.

References

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