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CONCURRENT ENGINEERING APPROACH IN PRELIMINARY DESIGN OF A MULTI-PURPOSE MODULE FOR A LAUNCH SYSTEM

Abstract

The upper stage of a launch system plays a fundamental role in the success of any mission having the function of orbital injection of the payload. A key role in the space sector is the increase of the number of functions that a single system or a single component is able to provide. A traditional upper stage can be replaced by a multi-purpose module able to perform different kinds of missions such as: orbital life extender for scientific missions, disposal of inoperative satellites or dispenser of small satellites. The increase of its function capabilities comes at the cost of an augmented criticality and complexity of the upper stage multi purpose module. Concurrent Engineering (CE) is a systemic and systematic approach that makes possible the development of a complex product or system employing real-time interdisciplinary activities [1] [2]. The aim of this work is to show the efficiency of a CE-based approach in the preliminary design of an innovative upper stage multi-purpose module that is envisioned to provide several functions: attitude and orbital control of the payload, power supply to the payload during the orbital phase, disposal of debris and dispenser of multi payloads. Results suggest that the CE approach allows to optimize the development of the preliminary design phase in terms of time and needed computational resources. Finally, the feasibility of the upper stage multi-purpose module is demonstrated through the configuration of a concept which fulfils the project requirements.

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