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New Space and New Science (3)

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INDUSTRIAL APPROACH AND STRATEGY FOR NANOSATELLITES MASS PRODUCTION

Abstract

The process of creation of a space market in the field of nano and micro satellites has been boosted in the last 15 years by the advent of cubesats: they have introduced a new standard, breaking the status quo and demonstrating the incredible potential of a smaller and low cost platform in space technology applications. The standardization can have the effect to make the space industry more similar to large scale production and distribution industrial sectors: this can be observed for example taking in consideration different recent projects that refer to constellation of multiple satellites. While the realization of a single satellite does not involve problems related to manufacturing strategies, the scenario of multiple identical satellites start to pose important questions related to industrial strategies of mass-production and make necessary the application of correct approaches to accurately determine costs for missions accomplishment. A study upon the application of industrial production coefficients to the field of nano and micro satellites has been carried out: in particular the creation of a constellation of satellites constituted by a variable number of units has been taken into account as a case study and the cost per unit has been estimated considering direct costs and allocating indirect costs on the base of predetermined coefficients. The model and the procedure applied are based on the production policy of companies involved in the integration and realization in series of mechatronic systems with high technological content, where the standard of quality and tests can be considered in a certain way similar to the ones required in the aerospace field. The list of the main processes required for the design, manufacturing and integration of a complete flight qualified satellite, the depreciation costs of the necessary equipment and the human resources costs, have been investigated and analyzed. In the paper results of the performed study will be presented, in order to obtain an estimation of industrial costs and create an hypothetical strategy for the mass production of nanosatellites.