

Building low-cost nanosatellites: the importance of a proper environmental tests campaign - IAA-LA-11-04

Almeida, J. S.

*Instituto Nacional de Pesquisas Espaciais - INPE
Sao Jose dos Campos, SP
jsergio@lit.inpe.br*

Abstract

For the past few years the world space community has been witnessed an ever increasing interest in producing very small satellites. This has been made possible mainly from the miniaturization and better performance of electronic and some mechanical components, but also because of the relatively lower costs associated to the project, production and launching of these tiny spacecraft. One of the most distinguished examples of these nano-satellites is the CubeSat, kind of a standard format of 10cm x 10cm x 10cm in size and with mass up to 1,33kg as first proposed by a team from the California Polytechnic State University and the Stanford University. Classified as 1U, variations of this basic format led to larger spacecraft models such as 2U, 3U, 6U, 9U and so on. These nano-satellites proved to be quite interesting and very valuable in terms of giving students the opportunity of better understanding and closely learning the details of the process of the design, construction, tests, launching and operating a real spacecraft, and also very useful in terms of a low-cost platform for the qualification, in orbital flight, of some new technologies for space application. However, with the typical low-budget and, very frequently, short time of design, construction and production associated with these academic-favorable nanosatellites, a significant risk appears in terms of underestimating the absolutely unquestionable importance of the environmental tests that the spacecraft has to be submitted in order to increase its probability of operational success during the launching and expected orbital flight. Recalling that typically the CubeSats and other relatively lower-cost nano-satellites make use of COTS components, and frequently include new kinds of payload equipment, more attention and more severe environmental ground tests shall be recommended. This work intends to discuss this issue in more details, highlighting the need of more time, appropriate specification and significant commitment in terms of a proper environmental testing campaign in the Laboratory, for the benefit of the expected success of the launching and life-time orbital operation of the spacecraft.

Keywords: Nanosatellite, CubeSat, Spacecraft Environmental Tests