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Generic Technologies for Nano/Pico Platforms (6B)

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DEVELOPMENT OF NANO-SATELLITE WITH RE-ENTRY CAPSULE

Abstract

Purpose: A very recent trend of creating and launching of nano-satellites of extremely small sizes has spread all over the world. Due to low cost of such space devices small nations (like Lithuania) have a good chance of working on real space technologies, which was impossible just several years ago. To keep up with other small nations working on high-tech space technologies it was decided to develop a nano-satellite project.

Methodology: Generally the satellite to be created should consist of two parts – service module consisting of the tested industrial components and the “research” unit which should be new and interesting from the scientific point of view. Initial project was to construct a double or triple cubesat consisting of two single almost independent units – service + research. From the very beginning of the project it was considered that the service module should consist of the tested and reliable technologies and components and be as much “low risk” as possible. Thus the research unit of the satellite should be original and be intended for original scientific task. Such a task could be the construction of capsule (about 700 g) capable of re-entering the atmosphere and being retrieved after the landing on surface of the Earth. The capsule should allow safe returning of a small payload (up to 100 g) from space to the surface of the Earth. Some lightweight landing and flotation system is being constructed and researched. The idea of satellite consists of the launching of complete satellite (service unit + scientific payload), complete satellite operations (establishment of communication, position determination, attitude control testing etc.), satellite deceleration (by means of active propulsion, which is researched at the moment), separation of re-entry capsule, its entry to the atmosphere and safe landing, further operating of the service unit till its entry to the atmosphere and dissociation. Therefore entire mission could be divided into two almost independent operations: satellite operation and re-entry.

Conclusions: As can be seen quite ambitious goal of creating the re-entry capsule of cube-sat dimensions with its retrieving possibilities has been raised. Some conclusion can be made: 1. Satellite under construction should consist of two parts – service module constructed of reliable components and re-entry capsule which is completely new having in mind its size; 2. Special mechanism of deceleration is investigated; 3. Soft landing and on-Earth position determination instrumentation is being prepared.