

NEW SMALL SATELLITES MISSIONS FOR CARLO GAVAZZI SPACE

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ABSTRACT

This paper presents the planned and on-going programs in Carlo Gavazzi Space (CGS) for the next five years. Thanks to the success of the first MITA platform mission, CGS has acquired a consolidated experience in Satellite System Design and of Prime Contractor in Satellite programmes. After two years from launch of first MITA platform from Plesetsk (CSI) several mission concept and satellite program have started and are under developing: RUBIN2 launched on December the 20th 2002, AGILE planned to be launched at the end of 2004, HypSEO planned to be launched in 2007, PALAMEDE, three commercial satellites. The common elements to all these program is the low mission cost and short development plan.

1 INTRODUCTION

CGS is the main supplier of standard platform to Italian Space Agency (ASI) for scientific and commercial mission. In particular CGS has been the prime contractor for the MITA mission and thanks to this experience is realising other several mission described in the article.

2 RUBIN-2

RUBIN-2 is the latest satellite design by CGS as leader of a number of industrial and university partners. The spacecraft combines low mass, high technology and low recurrent costs.

The main characteristics of the spacecraft are: mass 30 kg, dimensions 350 x 350 x 200 mm and peak power consumption of 15 W.

The satellite has been successfully launched on December the 20th 2002 by a three stages Dnepr from Baikonour (Kazakistan) base. It has been placed in a circular orbit of 650 km of altitude and 65° of inclination, it is sun-pointing with the solar panels located on the upper surface of the spacecraft.

RUBIN-2 is nowadays in commission phase and will test new telecommunication and navigation systems in orbit derived from terrestrial products such as:

- Low cost GPS receiver and antenna for exact orbit determination,
- Lithium-ion battery with higher energy density than conventional batteries,

- High voltage converter section to supply electrical thrusters available on the market,
- ORBCOMM transponder to communicate with satellite simply with an e-mail,
- Non conventional low cost solar cells to power the spacecraft.

The use of these technologies will contribute to decrease the cost of space missions.

3 AGILE

AGILE, which stands for “Astro-rivelatore Gamma ad Immagini LEggero” (Gamma-ray Astronomical Low-Mass Detector) is the first implementative mission of the MITA bus, selected by ASI as the first mission of its Small Scientific Missions Programme. The compatibility of MITA platform for AGILE mission has already been verified during the previous phases of the program.

The payload is the results of the cooperation between CNR and INFN laboratory and Trieste and Rome/Tor Vergata Universities.

The scientific goal of AGILE is to provide the Scientific community with an astronomical observatory for Sky Mapping in the high energy spectra, thanks to a solid state low-mass silicon Gamma Ray detector.

The satellite will be launch at the middle of the 2005 in a circular orbit of 550 km of altitude and less that 6° of inclination. During the orbit operations, AGILE will perform sky map study by means of observations campaign divided in time periods of roughly two weeks, during which the field of view of the instrument will be oriented always in the same direction.

The satellite mass will be 300 kg and power consumptions 190 W and the mission lifetime will be 2 years.

4 HYPSEO

HypSEO, which stands for “HyperSpectral Earth Observer”, supported by ASI, is the first Earth Observer mission for CGS. The very demanding characteristics of the Hyperspectral camera, like Swath width of 20 km., Spatial resolution of 20 m., Spectral resolution of 10 nm over a spectral range from 0.4 to 2.5 μm , 12 bit data, data fusion capability with a panchromatic image of 5 m spatial resolution, etc., require innovative solutions for the MITA Bus.

The Platform is CGS responsibility and is an update of the MITA bus in order to reach high performances in terms of pointing accuracy and reliability. The mass of the platform (without the payload) is 280 kg, the power consumptions is 200 W mean and 400 W peak, the attitude pointing accuracy is better than 0.185° around Nadir direction.

The launch is predicted in 2007.

5 PALAMEDE

PALAMEDE will use components and technologies not space qualified and therefore by far cheaper than those normally used for space systems, the second is that it is entirely realised by the students of Politecnico di Milano. PALAMEDE team is now

composed by five students working on mechanical, telecommunication and electronic system design.

PALAMEDE will use the same technologies to be validated on RUBIN-2 mission. The program is in Detail Design phase for some subsystems such as Mechanical, OBDH, AOCS and Power, and still in Preliminary Design phase for the others.

The payload is composed by two cameras: one CCD colour camera, which shall take pictures of the Earth and an infrared camera, which shall take pictures of the outer space.

6 COMMERCIAL SATELLITES

Three commercial Satellites missions are under developing: the programs main characteristics is that together with the mission (space and ground segment is offered) a technology transfer is also offered. During the program CGS personnel will teach client team in design, manufacture, assembly, test and maintain a satellite mission.

The typical duration of each program is two-four years, starting from the B phase until the launch; CGS will maintain the responsibility of the mission while client team will learn to design and operate a satellite.

The technology transfer will be carried out by using lessons, also in collaboration with Politecnico di Milano, company stages, tutoring, supervisory and side-by-side work.