

THE ITALIAN APPROACH TO SMALL SATELLITES FOR  
LOW COST ACCESS TO SPACE DEVELOPMENTS

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ABSTRACT

Several technological institutions and scientific center are presently forbidden to access space exploration, because of the high costs involved with satellite development and launch.

ITALSPAZIO has performed several studies directed toward the minimization of such costs.

Possible design approaches are:

use of a small bus capable to fly at marginal cost on expendable launch vehicles by paying delta-costs when passing from one launcher class to the upper next of the same launcher, (an example is constituted by the ARIANE IV when passing from AIRANE 40 to ARIANE 42s);

use of left-over launcher capacities;

use of subsystems and equipments developed for the two cases above, but using lower cost launcher.

The first design concerns with a small bus, optimized for the ARIANE IV, ARIANE V, DELTA II vehicles, capable to operate in geostationary orbit or in inclined eccentric orbits with suitable adaptations. It can support scientific and communications payloads.

The satellite configuration depends upon the payload power and the mission requirements and it has a 400 N bipropellant motor for transfer from parking to geostationary or inclined orbit, it is a modular spacecraft and use integrated electronic units.

The second design is oriented to a GAS Getaway Special approach tailored to carry technology or scientific experiments of short duration, typically 1 or 2 months. GTO orbit, but also different orbits can be envisaged, using the mass and volume available on

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the launcher without interfering with the main passengers. The spacecraft platform can be spin stabilized at very low spin rate or three axis stabilized. Its baseline does not use propulsion and the structural mass is minimized in order to permit the maximum usage of the launcher margins for payload accommodation. For selected usages stabilization means are considered.

The third design derives from the above two cases. The small platform is compatible with small launchers. The missions will mainly be LEO orbit, missions devoted to earth research, and sky observation. With some refurbishment adaptations the platform could also be launched by other commercial vehicles as secondary passenger. The platform will be gravity gradient stabilized and use magnetic torquers to correct large attitude errors.

In all cases the leading rules for the spacecrafts design considers the modularity concept in order to take full advantage of each launcher and at the same time to have a common basic bus or element for a mass production.

This approach permits to strongly reduce the cost of access to space, at the same time providing the user with similar environment and performances of larger multipayload satellite.