

EUCASS 2013

“PAYLOAD COMFORT – A Challenge for launcher’s design” Vincent LE GALLO (ASTRIUM Space transportation)

- ABSTRACT -

The “PAYLOAD COMFORT” is considered as a challenge for launcher’s design. The reduction of vibration, acoustic and shock levels requires a constant attention for launcher. A continuous work has been performed on ARIANE 5 to maintain low level but the payload comfort is always an issue and improvements will be considered for new generation of launchers.

Among other events in flight, we point out the following major events limiting the payload comfort:

- Low frequency vibrations that occurs during the first phases of flight with two major load cases that are the blast wave at lift-off phase and the solid rocket booster thrust oscillations after 100 seconds which can generates significant dynamic environments. In order to reduce the impacts of these vibrations, an isolation device has been implemented between the boosters and the central core of the launcher, and a damping device has been installed on the cryogenic upper stage.
- Shock levels due to the fairing separation. A new separation system has been developed in order to reduce these shock levels.

The development of new versions of ARIANE launchers will be a new step in the dynamic environment control with challenging objectives to be reached. Therefore, it will be an opportunity to introduce new technologies and approaches, taking into account short, mid and long terms activities. The paper gives an overview of the main items, scoping on:

- Short term issues through a better mastering of the damping factors on launchers. Dedicated tools like a virtual testing method are being set-up to evaluate the damping brought by junctions, backed by flight analysis used for validation.
- Mid term issues through the introduction of dedicated hardware like Payload Isolation Device (PID) whose aim is to guarantee a friendly low frequency environment to the payloads.
- Long term issue through the introduction of Active Isolation Device (AID) and damping structures.

This problematic shall be efficiently treated through an international network involving laboratories, universities, research centres and industrial partners.