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Noordwijk, 20 May 2015

Subject: Letter of support to the proposal: "Closed loop pyro shock simulator based on (de)synchronized pulses for testing of aerospace components"

Dear Mr Alvino,

With the present letter, the European Space Agency (ESA) and in particular its technology centre (ESTEC) confirm the technical relevance of such development for future space missions.

Different types of shock events can occur in spacecraft, either generated by launcher separation events or by internal deployment events. These shocks are known as pyrotechnic shocks.

The project is aiming to define a pyrotechnic shock test bench with the following technical characteristics:

- The test bench includes a number of impactors (preferably electro-magnetic but can also be pneumatic). The impactors will be placed on a ringing plate (used to propagate the shock waves generated by the impactors).
- The test bench includes a control system adapting force amplitude and phase of the impactors to reach automatically the required Shock Response Spectrum (SRS) at the tested equipment foot. The SRS is measured at the equipment foot by using accelerometers compatible with high shock levels.
- The convergence to the required SRS will be reached by plenty of trials (for example 1 shock every 30 sec), by permuting the impact point and combining several impact points, including some phase shift between the impact points.

This test bench would have the following benefits, once properly designed, manufactured and qualified:

- The calibration phase, usually performed on an equipment dummy during a minimum of two to three days by an experienced operator, will be automated in such a way that the operator does not need to be permanently present during the calibration phase. This will likely significantly reduce the calibration phase duration and therefore cost.
- It will cover the typical spacecraft pyrotechnic shock levels.
- It can be transferred to other engineering sectors like automotive for example.

Yours sincerely,

Franco Ongaro
Director, Technical and Quality Management