SPACE PROPULSION SYMPOSIUM (C4)
Propulsion concepts and studies (9)

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FUTURE LAUNCH VEHICLE NEW TECHNOLOGIES FOR SOLID PROPULSION

Abstract

In line with European road map on the new evolutions of Solid Rocket Motors for launcher application, AVIO is involved in the identification and development of new technologies to consolidate and improve the performance of existing and new launcher systems. In particular the activities are focused on the development of technologies with a short-medium term demonstration within the frame of VEGA program, with long term perspective and improvement for what concerns ESA Future Launcher Preparatory Program (FLPP), which has the objective to prepare the technical and programmatic elements for making an informed decision on the best launch system to respond to the future institutional needs while maintaining competitiveness on the commercial market.

Four investigation areas have been identified: materials, technologies, configuration and improvement of physical phoenomena comprehension/modelization. In particular:

- new materials development will be focused on composite case, internal thermal protection and nozzle flexible joints components
- new technologies development will be focused on composite case, propellant grain and nozzle divergent components
- new configuration development will be focused on composite case and nozzle flexible joint components
- the methodological development will be focused on comprehension and modelization of pressure oscillation phenomenon

The following improvements are foreseen:

Case. A new carbon-epoxy prepreg system is under development with the aim to avoid the dependence on a non-European supplier; intersegment connection and not-integrated skirts are under investigation to allow the manufacturing of large SRM

Internal thermal protection. A new rubber formulation based on EPDM is under development with the aim to reduce the inert mass of the SRM

Propellant grain. New mixing/casting techniques are under development with the aim to enable the realization of large monolithic SRM.

Nozzle. New resin infusion technology is under development to produce carbon-phenolic divergent components with the aim to increase the robustness and to reduce the cost of the process currently used; self protected flexible joint with composite shims is under development with the aim to reduce weight and torque of the component

The article will provide an overview of Avio new technologies for future space applications.