

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)  
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Author: Mr. Daniele Barbagallo  
ESA, Italy, daniele.barbagallo@esa.int

FILAMENT WOUND SOLID ROCKET MOTORS FLIGHT DATA ANALYSES AND THEIR IMPACT  
ON PAYLOAD ENVIRONMENT

**Abstract**

Payload sector continuous evolutions, due to technology improvements and spacecraft new solutions implementations, lead to a consequent launchers sector adaptation and challenge, aiming at offering the most comfortable launch condition to the payload. In parallel, current economical conjunction forces launchers providers to be more competitive in terms of costs towards customers. In this sense, spacecrafts comfort and low cost solutions are seen as particular efforts to be more attractive in the frame of launcher market. In this context, evolution of European launchers fleet is keen on this aspect, especially concerning VEGA small launcher project: introduction of many new technology solutions, of which filament winding use for realization of solid rocket motors is the principal one, is giving an important asset on payloads comfort improvement. Being VEGA launcher project in its maiden flight exploitation phase, an important amount of real data are available, from flight experiment and from subsystems qualification static tests (firing tests, separation tests, etc.); it is consequently necessary to set up specific new methodologies and activities, aiming at evaluating effective improvements at payload level: in particular, taking advantage of both maiden flight and firing tests campaigns held in past years, a dedicated exploitation activity on experimental data has been performed, focusing on structural dynamic aspects; data correlation, energetic contents quantifications and single phenomena effective influence evaluation at system level have been main drivers for the methodology development and practical realization. This paper, hence, resumes and makes an overview of results coming from these analyses on VEGA solid rocket motors, P80 FW, Zefiro 23 and Zefiro 9, highlighting differences and commonalities of filament wound motors behaviour during burning phases that lead to different dynamic environment for launcher payloads and possible future improvements. Finally, flight data comparison will give the confirmation of such improvements with real launcher configuration.