SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Future Space Transportation Systems Technologies (5)

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SYSTEM DRIVEN TECHNOLOGY SELECTION AND MATURATION APPROACH FOR FUTURE EUROPEAN LAUNCH SYSTEMS

Abstract

In the framework of the next generation launcher activity at ESA, a top-down and a bottom-up approach has been performed for the identification of promising technologies and alternative conception of future European launch vehicles. The top-down approach consists in looking for system-driven design solutions and the bottom-up approach features design solutions leading to substantial advantages for the system. The main investigations have been focused on the future launch vehicle technologies. Preliminary specifications have been used in order to permit sub-system design to find the major benefit for the overall launch system. The development cost, non-recurring and recurring cost, industrialization and operational aspects have been considered as competitiveness factors for the identification and down-selection of the most interesting technologies. The recurring cost per unit payload mass has been evaluated. The TRL/IRL has been assessed and a preliminary development plan has been traced for the most promising technologies. The potentially applicable launch systems are Ariane and VEGA evolution. The main FLPP technologies aim at: reducing overall structural mass, increasing structural margins for robustness, metallic and composite containment of cryogenic hydrogen and oxygen propellants, propellant management subsystems, elements significantly reducing fabrication and operational costs, avionics, pyrotechnics, etc. to derive performing upper and booster stages. Application of the system driven approach allows creating performing technology demonstrators in terms of need, demonstration objective, size and cost. This paper outlines the process of technology down selection using a system driven approach, the accomplishments already achieved in the various technology fields up to now, as well as the potential associated benefit in terms of competitiveness factors.