

IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Launch Vehicles in Service or in Development (1)

Author: Mr. Akhil Gujral

The Aerospace Corporation, United States, akhil.gujral@aero.org

Mr. Randolph Kendall

The Aerospace Corporation, United States, randolph.l.kendall@aero.org

Dr. Vinay Goyal

The Aerospace Corporation, United States, vinay.k.goyal@aero.org

Mr. Jon Strizzi

United States Space Force, United States, jon.strizzi@spaceforce.mil

LAUNCH VERIFICATION EFFICIENCIES

Abstract

The Aerospace Corporation has a long history supporting and collaborating with the United States Space Forces National Security Space Launch (NSSL) programs over many decades. New launch systems are being developed and built under different paradigms and processes with increased automation and process control utilizing state-of-the-art electronic systems. Shorter cycle times and more dynamic processes are being implemented from acquisition, through engineering, qualification and manufacturing, resulting in increased throughput and economies of scale. All launches carry risk, however, and the NSSL program uses mature Mission Assurance (MA) processes to manage the risk to launch critical, high value payloads with high reliability at acceptable risk levels. This approach has resulted in an unprecedented string of 78 successful NSSL launches. Continuous pressure on resources and an unprecedented surge in demand driven by the need to on-board new, rapidly developing launch systems and an increased launch tempo drives the need for more efficient MA processes. MA, therefore, needs to be agile to program changes while maintaining high confidence in the risk assessments. The Aerospace and NSSL MA strategy positions us to adapt to a wide range of future customer needs, CONOPs and mission sets. This paper describes some early initiatives to streamline our MA processes. These include a combination of re-flight efficiencies, suspensions and scope reductions of independent verification and validation tasks, and analysis and day of launch process improvements, for heritage launch vehicles (LVs). It also describes resource demands associated with new entrant non-recurring design validation efforts and steps being taken to partially offset these demands through agile MA initiatives applied to the design, production and launch readiness activities, while maintaining mission success in a cost-effective manner. Key is the close monitoring of Fleet Surveillance (non-NSSL launches) and the ability for the Government team to address potential cross-over concerns for NSSL missions. Given the high cadence of projected commercial launches, it's vital to have the tools to quickly assess flight data and perform flight margin verification within hours rather than days or weeks. This paper discusses some tools being used and developed to leverage a) automation efficiencies such as Artificial Intelligence, Machine Learning, Predictive analysis, Cloud Computing, and b) Process efficiencies including remote review and monitoring of LV telemetry, voice and video and in-line pedigrees to optimize critical human resource utilization to achieve high reliability. Aerospace and NSSL's MA strategy positions us for a wide range of current and future customer needs including but not limited to multi-mission manifesting, rapid/responsive launch and reusable launch systems.