Axient: Driving Safe and Assured Missions for NASA

Executive Summary

Axient is a premier provider of Safety & Mission Assurance (S&MA) to NASA missions of all types and risk paradigms, from Class A and manned flight levels to Class D. We perform these services on all types of space missions, from airborne and suborbital payload flights, to large and complex on-orbit observatories in low earth, geostationary, deep space, lunar, and Mars space environments. Our experience in the engineering of space systems informs an in-line S&MA approach from a position to detailed technical knowledge to identify and address S&MA requirements for NASA and commercial space missions with NASA. NASA space missions vary in terms of levels of acceptable risk. Detailed knowledge of the systems enable risk-informed decisions that affect flight safety and mission success. A structured life cycle process provides in-line S&MA, assuring the design is appropriate for the risk classification and related policies and procedures.

Importance

NASA's spaceflight missions have inherent risks to the safety of crew, support personnel, and the public at large. A robust S&MA program is applied to make risk-informed decisions about the safety and reliability of the systems. Axient has been providing engineering-based S&MA services to NASA for over 25 years. Our experience spans multiple NASA Centers, space and launch systems (crewed and uncrewed), aircraft and aeronautic systems, range operations and mission types and mission phases (design and development, I&T and validation, launch, and orbital operations).

Customer

Goddard Space Flight Cetner, Ames Research Center, Armstrong Flight Research Center, Johnson Space Center, and Kennedy Space Center

AXIENT'S APPROACH

Axient's approach spans "policy to parts," space and ground, and requirements to validation. We follow NASA OSMA policies, standards, procedures, and guidelines to:

- Develop, evolve and comply with S&MA policies, performing training and audits
- Assess flight and ground safety, analyze risks, and develop project-specific safety plans
- Drive an occupational safety program that protects workers and the public, and protects the environment
- Apply, develop and disseminate lessons learned from past mission to inform potential risks
- Perform detailed assessments the mission design, software, materials, parts and related for the relevant space environment and mission concept of operations to identify safety, reliability and maintainability concerns
- Maintain properly calibrated ground test equipment and assure pressured vessel safety
- Investigate failures and anomalies for root cause and corrective action, either in pre-launch testing or during mission operations
- Provide airworthiness and certificate of flight (CoFR) assessments and recommendations to NASA

Our approach features model-based mission assurance wherein modeling and simulations of designs in their operating mode to ascertain where risks might occur. This supplements rule-based mission assurance. Axient is uniquely capable of performing model-based assessments of detailed designs based on our experience in designing such systems.

In the world of exploration, we are seeing more systems of systems (SoS) and family of systems (FoS), as opposed to standalone mission systems, which require SoS and FoS analysis capability. We constantly evolve our approach to adapt to these trends.

In addition to providing S&MA for NASA, Axient also delivers expertise to commercial launch vehicle companies and spaceports in obtaining FAA approval to conduct operations. We utilize unique tools that analyze the flight trajectory and associated airspace infringements and debris field analyses to establish to inform safety decisions, as well as support the analysis of launch vehicle and spaceport systems for risks.

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