



a.i. solutions

## Mission Assurance Capabilities

**a.i. solutions** has been providing mission assurance services and support to its customers since 1996. As our company has evolved, so have the capabilities and experience we bring to the Missile Defense Agency, the US Air Force, and NASA to ensure mission success. Our mission assurance capabilities include support to:

- Launch Vehicle & Missile Systems Engineering
- Mission-Critical IT

### **Launch Vehicle & Missile Systems Engineering.**

Our staff consists of Systems Engineering expertise including specialized technical disciplines (Radar, Optics, Guidance, Navigation & Control [GN&C]); Electrical Engineering disciplines (Power, Avionics, Network Systems voice/data); and Mechanical Engineering disciplines (Structures, Propulsion [solid/liquid]). We provide engineering expertise and technical advisory assistance in support of the **Missile Defense Agency** and Ballistic Missile Defense System program operations. We ensure compliance to the Mission Assurance Plan by leading analysis of risk through all project phases and perform validation by reviewing and auditing supplier processes. In support of spacecraft and missile sensor design, we participate in the development of major systems through independent assessment of radar and optical signature analyses of targets to verify compliance with threat representative requirements using industry standard tools such as Xpatch and Optical Signature Codes modeling and simulation. We perform 6 DOF analyses, simulating missiles with both liquid and solid rocket motor systems, to verify missile performance and to demonstrate that mission requirements will be met. We also perform independent loads analyses using NASTRAN to verify that structural margins are adequate for all critical areas on the missile. Our Subject Matter Experts in parts, materials, manufacturing, and reliability of electrical systems and mechanical structures, support multiple independent reviews for the avionics system leading up to successful test flights. We participate in various independent reviews to ensure compliance to system/subsystem design, environmental requirements, and the Flight Test Mission process, including Mission Readiness Reviews, Pre-Shipment Reviews, Flight Operations Reviews, Pre-Flight Readiness Reviews, Launch Readiness Reviews, and Mission Operation Reviews.

For the **U.S. Air Force Rocket Systems Launch Program**, our engineering team performs independent mission assurance analyses in the areas of electrical component/system design, dynamic environments, and mechanical structures/loads assessments, supporting target and space launch programs. For guidance and thrust vector control (TVC) systems, we utilize drawing trees of the launch service contractors and follow their as design/as built lists to track the hardware components. We perform pedigree reviews, review rework, ensure industry best practices, and develop processes to screen for counterfeit parts. For TVC systems, we routinely perform nozzle tests in labs to improve design models. To support system design changes, our engineers assess the impacts of the change to determine if a risk exists. While Class II changes can often be accepted by similarity, Class I changes will often require validation in the test lab for approval. In the area of testing and qualification, we identify deficiencies or errors such as gaps in requirements, hardware design robustness, under qualified components through incorrect testing procedures, and errors in mission-unique models. In our software laboratory, we provide QA of flight hardware/software through flight simulations. We attend static fires for each of the motors used in our vehicles, such as the PK boosters for Minotaur IV.

For **NASA KSC's Launch Service Program**, we provide mission assurance expertise in the areas of GN&C; thermal evaluations of liquid and solid propulsion systems; and electromagnetic interference/compatibility (EMI/EMC) for avionics, sensors, and other electronic components and systems. We provide expertise in environmental requirements specifications and testing. We use military, NASA, and industry standards, or analysis/modeling results, to verify or define requirements. We review test plans, witness tests,





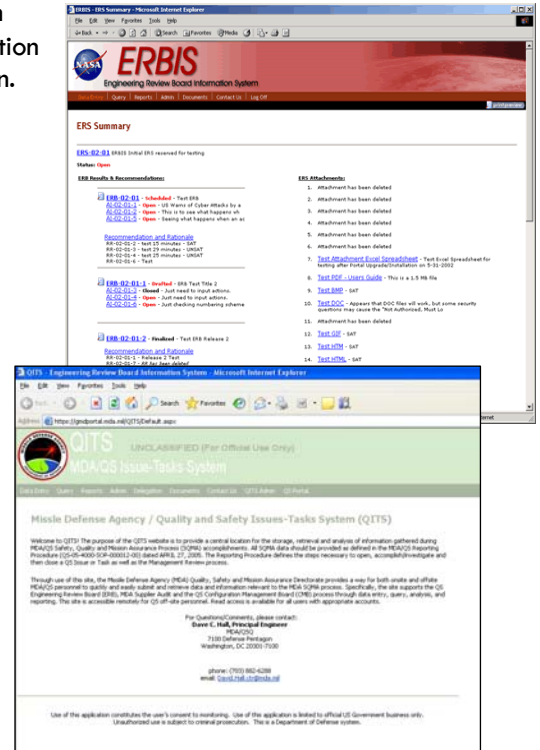
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and evaluate the results. We support pre-flight tests verifying mission data loads and simulation results of vehicle control systems. We sit on console with the launch service providers through Mission Dress Rehearsals, testing countdown procedures, including a series of contingency scenarios. During vehicle processing, we provide engineering judgment or analysis results as required to evaluate any anomalies and provide go-forward recommendations to the NASA Chief Engineer. For launch vehicle certification, we perform independent design and qualification assessments of the flight worthiness of the hardware components and the end system. We review hardware testing and qualification plans, witness select tests, and evaluate results. For mission specific requirements needing design modifications, we participate in mission unique PDR and CDR processes to clarify requirements and assess the preliminary and final designs needed to meet these requirements.

**Mission-Critical IT.** Our mission critical IT services range from system support to web-based applications and business information solutions development to system management and modernization. Our tools are developed to enable engineers, scientists and analysts to focus on the opportunities at hand, and not be concerned with paper processing or whether or not the right information is being captured and shared. The following is a sampling of tools created by **a.i. solutions** for our customers:

**ERBIS – The Engineering Review Board Information System** was created to document, manage and facilitate the Engineering Review Process. ERBIS allows the initiating engineer to log in through the ERBIS portal and open an Engineering Review Sheet (ERS). ERBIS automatically assigns an ERS number and provides an automated notification process for the appropriate reviewers. The automatic tracking system allows engineers to view the progress on action items, open issues, and final resolution. The built-in, mandatory approval process enables the Engineering Review Board members to better manage the resolution process. This web-based system is available to all approved users from any location. The ERBIS knowledge database is searchable by launch vehicle, mission, part number, system or vendor. It enables the creation of metrics that facilitates trending and tracking of issues used in risk evaluation. ERBIS allows Launch Services knowledge management, control of processes, and tracking of activities that prevent “memory loss” for the ELV Program. and reduces risk through the use of a repeatable process.



**QITS – The Quality, Safety, and Mission Assurance Issues Task System** provides a user-friendly, web-accessible database application that allows MDA/QS personnel to quickly and easily submit, retrieve, and archive time sensitive, mission-critical anomalies, events, and activities. QITS provides metrics on the number and criticality of anomalies and is used to assess how critical the anomalies are and how quickly they are being closed. QITS allows users to identify trends or problem areas where resources should be focused. QITS is used by MDA/QS personnel worldwide and is hosted from MDA’s Huntsville, Alabama, location. QITS provides an online repository which supports the centralization of data, allowing MDA/QS engineers to easily report, track, and manage review board assignments and to retain historical records of issues and events affecting MDA’s missions. QITS assists in mishap investigations as the history and sibling issues for root causes identified by review boards can now be easily accessed and analyzed. QITS has brought greater automation to data collection, storage, and retrieval processes, enabling fuller implementation of QS objectives and mission.

Ensuring your mission success is our goal. Please contact us to see how we can bring these and other mission assurance capabilities to your cause.

**For more information, contact:**  
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