

# Data Applicability of Heritage and New Hardware For Launch Vehicle System Reliability Models

---

## ABSTRACT

Many launch vehicle systems are designed and developed using heritage and new hardware. In most cases, the heritage hardware undergoes modifications to fit new functional system requirements, impacting the failure rates and, ultimately, the reliability data. New hardware, which lacks historical data, is often compared to like systems when estimating failure rates. Some qualification of applicability for the data source to the current system should be made. Accurately characterizing the reliability data applicability and quality under these circumstances is crucial to developing model estimations that support confident decisions on design changes and trade studies.

This presentation will demonstrate a data-source classification method that ranks reliability data according to applicability and quality criteria to a new launch vehicle. This method accounts for similarities/dissimilarities in source and applicability, as well as operating environments like vibrations, acoustic regime, and shock. This classification approach will be followed by uncertainty-importance routines to assess the need for additional data to reduce uncertainty.

Authors: Mohammad Al Hassan, Steven Novack

Bastion Technologies Incorporated

## BIOGRAPHY

Mohammad Al Hassan

NASA Marshall Space Flight Center / QD35

Huntsville, Alabama 35812

USA

*Internet (e-mail):* [Mohammad.I.alhassan@nasa.gov](mailto:Mohammad.I.alhassan@nasa.gov)

Mr. Al Hassan is a Probabilistic Risk Assessment (PRA) analyst currently working on NASA's Core Stage Avionics Space Launch System (SLS). Mr. Al Hassan joined the PRA team at MSFC in January 2014. Prior to PRA, Mr. Al Hassan was an electrical circuit analyst in the Risk-Informed Engineering Department for Southern Nuclear Company, Birmingham, Alabama. Mr. Al Hassan obtained a Bachelors of Science in Electrical Engineering from The University of Alabama at Birmingham. Mr. Al Hassan's expertise is in data development and uncertainty analyses.