DebriSat Fragment Characterization: Quality Assurance

Samantha Allen(1), Norman Fitz-Coy(1)

(1) University of Florida, PO Box 116250, Gainesville FL 32611-6250

The DebriSat project was developed around the premise of executing a laboratory hypervelocity impact (HVI) test to provide data that can be used by NASA and the DoD to update their models of the orbital debris environment. Under this premise, a test article referred to as DebriSat was designed to be representative of a modern LEO satellite in terms of its material content and design/fabrication practices. The DebriSat test article was then subjected to a laboratory HVI test where, in an effort to minimize damage of the fragments, the test chamber was lined with foam panels to minimize contact of the fragments with the chamber walls. The DebriSat fragments generated by the HVI and foam panels were carefully collected and transported to the University of Florida for extraction and characterization. During the characterization process, fragments are individually assessed for material, shape, and color, measured for its mass, and imaged to determine its size. The fragment assessment is qualitative, but the remaining characterization tasks are performed by the mass and imaging systems. Furthermore, these tasks are performed by an ever changing group of student technicians whom undergo extensive training. Thus, in order to generate type of dataset needed by NASA and DoD, quality assurance procedures are implemented. To this end, a series of modified Gage Repeatability and Reproducibility (Gage R&R) tests were developed and implemented. This paper discusses the Gage R&R testing methods implemented to ensure quality quantitative data from ever-changing group of technicians.