

SPACE DEBRIS SYMPOSIUM (A6)
Hypervelocity Impacts and Protection (3)

Author: Mr. James Hyde
Barrios Technology/ESC Group - NASA, United States, james.l.hyde@nasa.gov

Dr. Eric Christiansen
National Aeronautics and Space Administration (NASA), Johnson Space Center, United States,
Eric.L.Christiansen@nasa.gov

Mr. Dana Lear
United States, dana.m.lear@nasa.gov

Dr. Jason Herrin
United States, jason.s.herrin@nasa.gov

SHUTTLE POST FLIGHT MMOD INSPECTION HIGHLIGHTS

Abstract

This paper documents four significant micro-meteoroid orbital debris (MMOD) impact events on the shuttle: two perforations of the payload bay door radiator sandwich panels, one crater in the crew module window and another in a wing leading edge reinforced carbon-carbon panel. Evidence from Scanning Electron Microscope/Energy-Dispersive x-ray Spectroscopic (SEM/EDS) analysis of impact residue samples will be presented to identify the source of each impact. Impact site features that indicate projectile directionality are discussed, along with hypervelocity impact testing on representative samples conducted to simulate the impact event. The paper also provides results of a study of impact risks for the size of particles that caused the MMOD damage and the regions of the orbiter vehicle that would be vulnerable to an equivalent projectile.