FRACTURE TOUGHNESS, MECHANICAL PROPERTY, AND CHEMICAL CHARACTERIZATION OF A CRITICAL MODIFICATION TO THE NASA SLS SOLID BOOSTER INTERNAL MATERIAL SYSTEM

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ABSTRACT

A modified propellant-liner-insulation (PLI) bondline in the Space Launch System (SLS) solid rocket booster required characterization for flight certification. The chemical changes to the PLI bondline and the required additional processing have been correlated to mechanical responses of the materials across the bondline. Mechanical properties testing and analyses included fracture toughness, tensile, and shear tests. Chemical properties testing and analyses included Fourier transform infrared (FTIR) spectroscopy, cross-link density, high-performance liquid chromatography (HPLC), gas chromatography (GC), gel permeation chromatography (GPC), and wave dispersion X-ray fluorescence (WDXRF). The testing identified the presence of the expected new materials and found the functional bondline performance of the new PLI system was not significantly changed from the old system.