

Abstract Submitted
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Dynamic Properties of Polyurea 1000 W. MOCK, JR., S. BARTY-CZAK, Naval Surface Warfare Center, Dahlgren Division, G. LEE, J. FEDDERLY, Naval Surface Warfare Center, Carderock Division, K. JORDAN, Marquette University — A gas gun has been used to investigate the shock response of the viscoelastic material Versathane P1000. This polyurea material is synthesized from a polyamine (Versalink P1000, Air Products) with a multi-functional isocyanate (Isonate 143L, Dow Chemical). Versalink P1000 has a nominal molecular weight of 1000. The morphology of the resulting polymer consists of aromatic hard segments in an aliphatic soft-segment elastic matrix. Sabots carrying 9.5-mm-thick metal disks were launched into target assemblies containing the polyurea material. A target assembly consisted of a three-layer sandwich configuration: a 0.9-mm-thick metal disk on the impact side, a 6.5-mm-thick polyurea disk, and a 9.5-mm-thick metal backup disk. The metal disks were either OFHC copper or 6061-T6 aluminum. Impact velocities ranged from 280 to 920 m/s. Impact planarity was 1 milliradian or less. Thin film 50-ohm manganin gauges (Dynasen) were epoxied between the metal/polymer and polymer/metal interfaces in each target assembly to measure the interface stresses as a function of time. The polyurea shock velocity was also determined for each experiment. Measured longitudinal stresses ranged from 5 to 45 kbar. A comparison of the measured initial stress values and calculated pressure values suggests that the shear strength increases with increasing stress.

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