ASSESSMENT OF FRAGMENT-IMPACT IMPULSE AND BLAST LOADING CHARACTERISTICS OF BLAST ENHANCED EXPLOSIVE FRAGMENTATION MUNITIONS

V. M. Gold, J. R. Kraft, J. Pham, W. J. Poulos, G. M. Stunzenas & I. Wu

US Army RDECOM-ARDEC, Attn: AMSRD-AAR-MEE-W, Bldg. 3022, Picatinny Arsenal, NJ 07806-5000, USA

Performance of explosive blast and fragmentation munitions applied against civilian or military combat protective structures is a complex function of the mechanical energy available from the "air-blast-shock-wave" and that from the "solid-fragment-impact". In addition, depending on the explosion confinement environment and on the chemical composition of the explosive, the thermal energy part of the explosion may dissipate as a heat flux into the surroundings, or it can be "re-deposited" to the target structure as the mechanical quasi-static *PdV* work. Accordingly, the energy partitioning between the momentum deposited into the air-blast and the momentum transferred to the fragments is of great interest to the overall munition performance assessment. A new modeling and experimentation methodology for assessing fragment-impact impulse and blast- loading characteristics of enhanced blast formulations had been developed and compared to experimental data. The experimental assessment of the fragmentation and blast performance of tested charges was accomplished using a series of tests including the fragmentation arena and the fragment velocity tests, the sawdust fragment recovery experimentation, the open-air blast tests, and the closed-room detonation tests. The analytical assessment of the fragmentation parameters was performed employing the PAFRAG (Picatinny Arsenal Fragmentation) modeling methodology which links three-dimensional axial symmetric high-strain high-strain-rate hydrocode analyses with a phenomenological fragmentation model based on the Mott's theory of break-up of ideal cylindrical "ring-bombs". The PAFRAG modeling analysis has been shown to accurately reproduce available experimental fragmentation data.