OCCUPANT LEGS SURVIVABILITY: AN ASSESSMENT THROUGH THE UTILIZATION OF FIELD BLAST TEST METHODOLOGY

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Keywords: Mine blast test, energy absorbing, energy dissipation, vehicle floor, leg injuries, blast loading, foot protection, force-time response, vehicle blast test.

Abstract

Lower leg injuries are among the most severe threats in the field of protecting and armoring tactical and other military vehicles against underbelly landmine explosions.

The blast loading on the vehicle structure and, specifically, on the occupant floor, generates severe compression forces on the occupant's lower legs. In order to improve the survivability of the occupants, additional foot protection is necessary. Foot protection involves types of materials and mechanisms that are aimed at reducing leg reaction to the floor under a mine blast event (Guy et al., 2010). Such materials and mechanisms operate on the principles of energy absorption, energy dissipation and a change in force-time response while decreasing amplitude and increasing time duration.

The relevant materials and mechanisms can be affected by loading and strain rates. Consequently, it is necessary for their study to be conducted under the same dynamic conditions that develop during a mine blast. It is essential, therefore, for laboratory test methods and explosion test facilities to be less complex, to exhibit repeatable results, to be reliable and to be less expensive in comparison to the carrying-out of a full vehicle blast test.

This paper introduces a blast test methodology for loading a vehicle floor segment with the same dynamic behavior as generated during an underbelly landmine explosion. This method enables the examination of materials and mechanisms for foot protection systems by utilizing simpler, more repeatable and less expensive field test methods than those used in actual vehicle blast tests.

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