

EXPERIMENTAL INVESTIGATION OF ALUMINIZED EXPLOSIVES

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Aluminized explosives are distinctively different from ideal explosives. The aluminum powder adds energy to the combustion behind the detonation front. The amount of energy added under different charge configurations is currently under investigation. Small and large scale experiments have been performed to study the non-ideal behavior of aluminized explosives, including size effects, cased and uncased charges and the detonation of charges in air and in nitrogen.

Time-of-arrival, pressure and temperature data were obtained from these experiments to help define the free-air curve (FAC) for each configuration. The FAC for an explosive is defined as the peak overpressure-versus-range relationship that results from the detonation of a charge without any interference from physical boundaries. This relationship is unique for each explosive and can be obtained in a number of different ways, including measuring the incident pressures directly, measuring the shock front velocity, and using first-principle calculations to determine the free-air curves from measured reflected pressures.

The paper will include descriptions and results of these recent experiments. The types of tests include cased, uncased, full scale, subscale, air and nitrogen experiments that primarily used an explosive mixture of 80% TNT and 20% aluminum powder. A discussion of future efforts will be included.