Energetic Plasticizer Evaluation in Cast-Cured PBXs

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Ensign Bickford Aerospace and Defense Co. (EBA&D) has developed a series of cast-cured explosives for use in warheads and other weapon systems. Traditional cast-cured explosives often employ inert plasticizers / polymers owing to their affordability, excellent processability and resultant physical properties. However, the use of inert plasticizers / polymers in cast-cured explosives reduces performance. For some applications, the reduction in performance is unacceptable. For this reason, energetic polymers and plasticizers, such as GAP, poly(NIMMO) etc. have been developed in an attempt to address the energy shortfalls of traditional cast-cured explosives. EBA&D has explored the use of energetic binder systems, and has successfully developed explosives being fielded in weapon systems.

EBA&D has initiated a program to further improve the state of the art of cast-cured explosives, by conducting an evaluation of energetic plasticizers / polymers to determine their relative contribution and ranking on performance.

This paper focuses on the research into energetic plasticizers, including GAP, BDNPA/F and a new plasticizer, R8002. GAP and BDNPA/F are well known plasticizers. R8002 is made by BAE Systems at Holston Army Ammunition Plant, also the supplier of HMX used in the PBX processing trials.

This paper describes the results of the plasticizer evaluation trials, including the processing and physical properties of the explosive formulations made with GAP, BDNPA/F and R8002 plasticizer. Performance, processing, physical property and aging trial results on the explosives are discussed.