

Abstract Submitted
for the SHOCK13 Meeting of
The American Physical Society

Observation of sub-detonative responses in confined high density HMX-based PBXs¹ MALCOLM COOK, ANDREW WOOD, PHILIP OTTLEY, QinetiQ Ltd, PHIL CHEESE, MOD — This paper describes experiments and modelling aimed at understanding the behaviour of highly loaded (90%-95%) pressed HMX-based PBX compositions, when subjected to shock compression and ignition, by means of a propellant donor charge, under confinement. Such tests are routinely carried out in the UK on new formulations to determine their burn to violent reaction characteristics. The Bullseye propellant donor charge has been characterised in terms of pressure and temperature output. A range of tubes have been designed to examine the contribution of tube material properties (steel versus aluminium, 218.5MPa) and to examine the effect of reduced confinement (120MPa). For the reduced confinement scenario polycarbonate as well as steel and aluminium vessels have been designed which allow the reaction of the energetic material to be captured using high-speed video. In particular, tests carried out in the polycarbonate tubes have given a good insight of the processes occurring. Preliminary hydrocode modelling runs predicted an oscillating compressive wave in the explosive and considerable damage at either end of the explosive column. The latter leads to potential deconsolidation once the donor charge has burnt out allowing increased burning and violence.

¹This work was undertaken as part of the MOD funded UK-Energetics research programme.

Malcolm Cook
QinetiQ Ltd

Date submitted: 25 Jan 2013

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