

THE USE OF RIGID POLYURETHANE FOAMS FOR PREVENTING SYMPATHETIC DETONATION

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ABSTRACT

The UK MoD Ordnance Risk Assessment Team provides specialist technical advice in support of safety cases for munitions, fighting platforms and explosives sites. A niche role it has acquired is on the design and development of explosives mitigation techniques for reducing residual explosives risks. One recent mitigation technology developed has been Rigid Polyurethane Foams (RPF). This paper will report on a two year project that has delivered proven prototype mitigation barriers for prevention of Sympathetic Reaction between large 1000lb aircraft bombs at a separation distance of less than 1 metre and for artillery shells at separation distances of as little as 2 charge diameters.

RPF are known to have good blast attenuation properties. RPF have now been shown to be particularly effective for attenuation of weapon fragmentation when subjected to a simultaneous large blast loading. It is proposed that the blast loading results in an increase in density of the collapsing RPF and provides a highly effective medium for fragment attenuation over very short material thickness. Results of ballistic tests, with and without shock/blast loading, will be presented as well as High Speed Video and X-Ray images taken at various times during combined blast/fragment attack.

Consideration of the shape of the barrier has resulted in selection of a diamond profile. This shape has been found to both aid the attenuation of blast by deflection and to also increase the degree to which the RPF is compressed, thus increasing the effectiveness for fragment attenuation. Images of the final prototype barriers will be provided along with results of proof testing for 1000lb bombs and 105mm and 155 mm artillery shell.

Testing culminated in a demonstration of a prototype barrier subjected to the detonation of a 1000lb Bomb suspended under a Tornado GR4 airframe. An adjacent 1000lb bomb on the aircraft did not detonate.