

RESPONSE OF CONCRETE PANELS UNDER BLAST AND FRAGMENT LOADING

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ABSTRACT

Whilst deflection of reinforced concrete panels under blast loading is well characterised, and has been verified with blast tests, the additional deflection experienced by a concrete panel when loaded by both blast and fragmentation is less well characterised. With increasing emphasis on urban conflict, DST Group is investigating the response of reinforced concrete panels to a combined blast and fragment load typical of a vehicle borne improvised explosive device (VBIED). To undertake this investigation a test rig was constructed that allowed the deflection of a concrete panel to be recorded at the half height, and quarter height. The test rig was designed to exclude blast from the rear face of the panel so as to better emulate the loading condition of a building component subject to a VBIED. A fragment projector was designed to produce fragments with a similar mass and velocity to those generated by a medium sized VBIED. Reinforced concrete panels with thicknesses of either 100mm or 150mm were tested against either a bare charge or a combined blast and fragment loading using the fragment projector. The bare charge produced a similar pressure history to the fragment projector allowing the effect of the fragments on the deflection history of the panel to be clearly distinguished. It was found that the fragments significantly altered the deflection history of the panels, however their effect was dependent on the difference in time of arrival of the primary shock and the fragments, and time required for the panels to reach peak deflection.