

## DEVELOPMENT OF RUBBERIZED CEMENTITIOUS-BASED MATERIAL FOR BLAST AND BALLISTIC PROTECTION

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**Abstract:** This paper discusses recent blast testing programs performed in Australia on various forms of the rubberized concrete material ProtectiFlex™, a blast and ballistic mitigating cementitious building product comprised of recycled tire aggregate, fibers, and other additives. Shock tube testing was conducted in the Advanced Blast Simulator (ABS) at the University of Wollongong – National Facility for Physical Blast Simulation (NFPBS) on a pumped composite panel form consisting of ProtectiFlex™ and reinforced concrete layers, as well as a spray-on shotcrete form of ProtectiFlex™ applied to retrofit masonry walls. Blast testing was carried out using a gas detonation driver mode of the ABS which closely replicated blast waveforms produced by free-field detonation of spherical explosive charges. The test specimens performed extremely well (e.g., minor damage with some rear-side cracking, but no spall behavior) in comparison to walls made of exclusively conventional materials and proved capable of protecting assets from high-intensity blast loads. This paper primarily focuses on the protective material technology, blast loading, observed damage, and deflection results that were documented during the test programs. Overall, these programs have demonstrated the applicability of the cementitious-based ProtectiFlex™ technology in various forms to provide an effective blast-mitigation solution for existing and new construction. The effort also highlighted the advantages of using the large-scale blast simulation facility for research and development of new protective materials. A series of blast (close-range detonation) and ballistic testing and analytical efforts conducted by Protectiflex, LLC within the United States that led to the Australian test programs will also be briefed.



Figure 1: Blast at Driver End of ABS During ProtectiFlex™ Wall Panel Test