

FORCE PROTECTION AGAINST ENHANCED BLAST

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Enhanced Blast Weapons (EBWs) have become an increasingly serious threat to deployed forces engaged in stabilization and peace-keeping operations. These weapons generate a strong shock wave that propagates through the atmosphere and produces high overpressures and extreme aerodynamic drag forces on objects in its path. Unlike fragments that can only engage 'line-of-site' targets, blast waves can propagate around obstacles and into trenches, tunnels or urban structures. Blast weapons are particularly effective against 'soft' targets including aircraft, ships, soft-skinned vehicles, radar domes, communication and power infrastructure, domestic buildings, and humans.

EBWs can take various forms on the urban battlefield. Insurgents routinely use vehicle-borne improvised explosive devices packed with military ordnance, plastic explosives, or home-made 'enhanced novel explosives (ENEs).' Infantry blast weapons have also become increasingly available to insurgents. Following the disintegration of the former Soviet Union, Russian 'thermobaric' explosive (TBX) weapons began appearing on the black market and have since proliferated world wide. Interestingly, ENEs and TBXs have similar characteristics; both are after-burning explosives that contain large amounts of metal powder.

In April of 2003, Defence Research and Development Canada (DRDC) - Suffield began a four-year Technology Demonstration Program (TDP) on 'Force Protection Against Enhanced Blast.' The overarching goal of the program is to increase the survivability of deployed forces in a blast environment. Both military and terrorist weapon threats are being addressed.

The first objective is to establish the limits of enhanced blast technology. The performance of after-burning explosives increases as the degree of physical confinement increases. Confining walls allow the shock waves produced by the initial detonation to reverberate back and forth in the confined space, mixing the available hot fuel with air as they do so. Both internal and external explosion studies have been carried out to quantify this effect. At the more practical end of the spectrum, approximately 20 defensive field fortifications have been tested for blast vulnerabilities. Both the response of the structure and the level of occupant injury have been assessed. A number of design improvements and blast mitigation strategies have emerged from this work. The blast vulnerability of Temporary Camps has also been addressed. Force protection in the urban environment is another important aspect of the TDP. When friendly forces enter a city, it is important that any building to be occupied have a high inherent resistance to blast. An existing Rapid Screening Tool (RST) is being modified to facilitate rapid building selection. The final deliverable is a software package called the 'Military Blast Effects Expert System (MBEES).' The software employs fast-running models and can be used to conduct rapid vulnerability assessments for planned or existing structures, to assist in the design of new structures, and to aid in the design of retrofits to existing structures.