DEVELOPMENT OF AN EFFICIENT LOW-COST BLAST TUBE FACILITY

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A new type of fuel-air driven Blast Tube Facility has been under development at DRES which will allow efficient low cost intermediate-scale blast simulation. Conventional blast waveforms over 600 kPa in amplitude and 100 msec duration can be obtained in the 1.8 m diameter test section. The driver section operates without the requirement of a diaphragm or special valves, or the set-up of HE-charges; the blast wave is created by the detonation of a fuel-air cloud which is dispersed in the driver seconds before initiation. The system requires only simple gas-flow valves and allows for fast turn-round between shots with minimal personnel or material requirements. Besides these practical advantages, the use of a fuel-air detonation in this fashion has merit from a scientific viewpoint since the blast wave flow is clear of diaphragm debris, HE combustion products, or the cold contact front typical of unheated compressed air drivers.

The firs 2 phases of this project have been completed which were to design and evaluate the major components of the facility. In this report details of the progress are described, and measurements obtained from the first evaluation trials are presented. In addition to conventional static overpressure and shock front time-of-arrival data, the DRES blast densitometer has been installed in the tube for resolving density-time records in the blast flow. Design and experimentation have been aided by the use of predictions from the Flux-Corrected Transport (FCT) and Random Choice Method (RCM) computer codes.