MOMENTUM TRANSFERRED FROM HE DETONATIONS TO STRUCTURAL COMPONENTS

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The blast measurement with pressure gauges at close-in scaled distances Z<0.4 m/kg''' is still a technical problem. Multiple peaks, sudden pressure changes, high peak overpressure and local jet effects cause delayed signal rise time, overshoot and ringing. Several local measurements on the component is needed to determine the total impulse. Often the gauges are destroyed.

A relatively simple and cheap method to determine the blast impulse is to measure the velocity of flying steelplates. The blast impulse from the HE detonation transfers momentum to a structural component and sets it into motion. A test Arrangement which proved to be favorite consisted of an unclamped steelplate shot vertically upward. The plate flies out of the fireball early. The 1 -dimensional vertical trajectory and local velocity can be measured by high speed video. The initial velocity can be calculated by taking into consideration the deceleration by gravity force. The maximum height and the total flight time of the test object allow redundant determination of the initial velocity.

The steelplate´s area was A = 1m * 1m with different mass m = 120 kg to 480 kg. The HE charge W = 1 kg to 16 kg was detonated at the distance R = 0.5 m below the plate's center. Fully vented and closed Arrangement were tested. Measured velocity varied from v = 10 m/s to 250 m/s, corresponding to impulses ranging from 1 = 1000 Pa*s to 30,000 Pa*s. Identical momentum was imparted to lightweight and heavy plates from identical charge Arrangement. Experimental results were reproducible and accurate within 5 percent. Compared to CONWEP the measured impulses were correct the smaller charges. Measured impulses were higher than CONWEP under high loading situations.