CALCULATION OF BLAST IN ENCLOSURES

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Explosions inside enclosures produce extremely complex blast waves that can be injurious to man for explosive weights far smaller than those that produce injury in the open. The development of a estimation of the injury possible in such situations is hampered by the lack of understanding of the blast environment itself. Experimental measurements have proven difficult to interpret because the instrument response is sensitive to location and orientation.

JAYCOR has used its computational fluid dynamics program, EITACC, to simulate the blast inside enclosures. The results have been compared with experimental data taken at the Albuquerque Test Site under sponsorship of the US Army Medical Research & Development Command. The agreement is quite
satisfactory.

The geometries have been studied: (a) explosions in an Armored Personnel Carrier (APC) and (b) explosions in a rectangular bunker. In the case of the APC, the force of the explosion opened some of the hatches and allowed venting of the explosion gasses. the effects of venting on the pressurization of the vehicle and on the gas dynamics following the initial shock wave could be reproduced by the calculations.
JAYCOR has also developed a simplified simulation of blasts in enclosures based on the method of multiple images. The model has been compared with experimental data and with computational results and a comprehensive understanding of the nature of the measured pressure field can be obtained. The influence of gage response characteristics and gage orientation have been evaluated. Requirements for instrumentation and its interpretation have been made.

The measured and calculated blast pressures have been used in JAYCOR's models of the biomechanical response to blast. When the pressure measurements are properly interpreted, the mechanical response of the thorax is found to correlate with the observations off injury to the lung.