Integrated Casualty Estimation Methodology (ICEM)

General Description:

ICEM is a software toolset that simulates the casualty effects of munitions against personnel with or without body armor. The model can be used to assess the effectiveness of body armor systems or munitions in terms of ballistic challenge, operational casualties, and injuries. ICEM will replace the Casualty Reduction (CASRED) model. Development has been overseen by an Integrated Product Team (IPT) co-chaired by representatives of the Natick Soldier Center, the U.S. Army Materiel Systems Analysis Activity (AMSAA), and the U.S. Army Research Lab - Survivability & Lethality Analysis Directorate (ARL-SLAD).

Objectives:

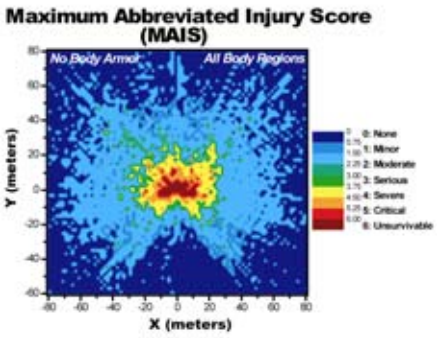
ICEM meets the need for improved casualty estimation tools and provides analysts with desktop functionality for applications ranging from engineering level body armor design questions to support for war games and simulations for force-on-force analysis.

Facts:

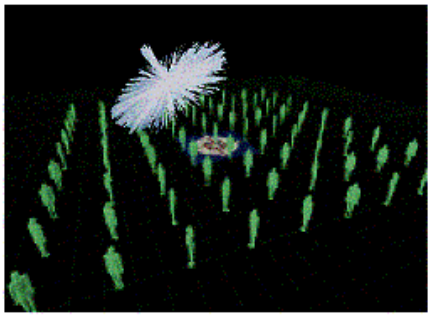
The user defines a target grid, consisting of 3D geometric representations of personnel. These targets can be positioned in various postures (standing, kneeling or prone) and orientations (random, fixed, directional) or squad specific formations. Also, the user explicitly defines the body armor configuration, specifying the actual location of the armor on each body part. This is a vast improvement over CASRED's percentage area of armor coverage.

The user specifies the munition characteristics such as angle of fall, height of burst, and terminal velocity. ICEM simulates munitions fragment bursts using standard Joint Munitions Effectiveness Manual (JMEM) fragmentation files. Fragment hits in the target grid are measured, and the environmental drag and body armor protection are calculated.

ICEM incorporates the ARL/SLAD Operational Requirements-Based Casualty Assessment (ORCA) model to obtain injury characterization and operational casualty measures. The penetrating fragments are passed to the ORCA Library to estimate casualties and/or personnel performance degradations.



Sample ORCA Output



3D View of Sample Burst Over Target Array

Schedule:

Current ICEM capabilities include a single indirect fire munition round fragmentation burst (ICEM version 1.0), an indirect fire multi-volley/multi-round munition burst (ICEM version 1.1) and a direct fire muniton burst (ICEM version 1.2). An ICEM bullet methodology (ICEM version 1.3) is scheduled for completion by end of 1QFY05. Completion of verification and validation (V&V) of ICEM versions 1.0-1.3 is scheduled by end of 2QFY05. An ICEM version 1.3 Joint Technical Coordinating Group/Munitions Effectiveness (JTCG/ME) Accreditation Support Package - Phase I (ASP-1) is scheduled for completion by end of June 2005.

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