

12TH ICCRTS

“Adapting C2 to the 21st Century”

AmmoSIM – Ammunition Simulation for Front Line and Command Units

Track: 7

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Abstract

AmmoSIM is an intelligent agent-based urban tactical decision aid (UTDA) for platoon and company commanders tasked with planning and executing military operations in urban terrain (MOUT). It is intended to provide warfighters with a tool to simulate and validate targeting effects in an urban terrain environment on the fly. Using accessed data from existing (and planned) terrain and tactical battlefield C2 sources and feeds, AmmoSIM calculates the ballistic trajectory of a given munition and models the effects on the target and surrounding area on the fly. AmmoSIM depicts the trajectory of weapon via a “virtual guidance Circular Error Probable (CEP)” in linked a 2D/3D view. The virtual guidance CEP is produced by combining sensor, munitions, and shooter characteristics in conjunction with calculations based on the targeting models from the Joint Technical Coordinating Group for Munitions Effectiveness (JTCEG/ME). It allows user to consider path obscuration or obstruction to the intended target, and weapon effects on known structure types using rubble generation algorithms. The intended result is to enable warfighters to more accurately predict where directed fires will hit and alert them to possible obstructions and structures or areas that war planners do not want hit from the rules of engagement.

Outline

- I. AmmoSIM models trajectory and Circular Error Probable (CEP) calculations
 - a. AmmoSIM utilizes a statistical model method as opposed to the standard Monte-Carlo methodology in calculating the most likely trajectory and error for a ballistic munition.
 - b. AmmoSIM visually displays the trajectory and CEP in a 3D environment allowing the warfighter to instantly see the effects of a particular weapon and what may be inadvertently hit. The data is built from attack guidance matrix guidelines.
 - c. AmmoSIM calculates the probabilities of hit, kill, and collateral damage instantly from the statistical model built into the software.
- II. AmmoSIM models the rubbleization of selected buildings using a first principles model
 - a. The 1st principles model uses conservation of energy to determine the material movement and debris field.
 - b. The model calculates the size, shape, and depth of the debris field.
 - c. AmmoSIM uses the model to determine the required number of hits to attain a desired percent destruction of the target.
 - d. Surrounding collateral damage is calculated from the extent of the debris field.
- III. AmmoSIM uses advanced 3D display technology and data access to display the information
 - a. AmmoSIM connects to a number of data sources (DTSS, NGA, DTED, Worldwide construction database, etc.).
 - b. AmmoSIM synchronizes the actions of C2 planners and in the field warfighters using a common display interchange.
 - c. A 3D game engine is used to show the battlespace, and a 2D map to show relational data.
 - d. The attack guidance matrix, target database, and asset database are used to construct the relevant information about the battlespace.
 - e. Geo-specific building models are displayed directly inside the 3D game engine providing a realistic view of the battlespace.
- IV. Summary
 - a. AmmoSIM integrates multiple data sources and a variety of separate data processing programs into one package.
 - b. AmmoSIM uses established methods found in Army Field Manuals and in the JMEM software package.
 - c. AmmoSIM displays the battlespace as an integrated picture showing recommendations directly to the user.
 - d. AmmoSIM is a real-time, small footprint software package designed to run on laptop computers or better.