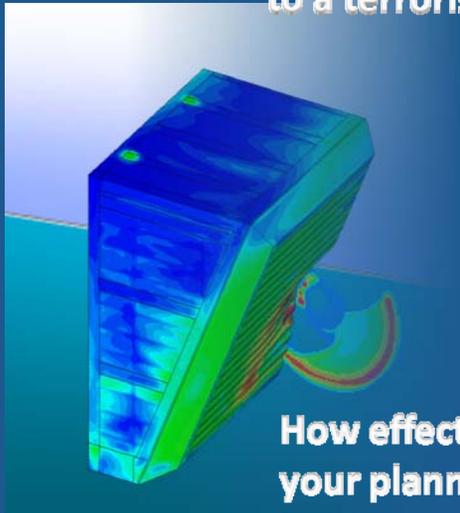




How well will your buildings stand up to a terrorist bomb?



How effective will your planned barriers and other countermeasures be?



What are the holes in your passive defenses against explosions?

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Modeling & Simulation of Blast Effects And Protection of Structures



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ATR brings superior capabilities, advanced software tools and extensive experience to the analysis of structures and countermeasures under blast threats



Background

Car bombs and other improvised terrorist weapons pose severe threats to infrastructure and nearby personnel. As we devise stronger structures and barriers, our enemies devise more ways to defeat them. Architects, engineers, and security professionals need better methods to assess the vulnerability of specific installations under a wide variety of threat scenarios—more scenarios than can possibly be understood through component-level explosive testing. Free-air and near-ground explosions against protected and unprotected structures create complex blast loading conditions requiring sophisticated modeling and simulation. Analysis must consider fluid-structure interactions and interactions between the building and candidate protective elements, in addition to the dynamic response of the building and its structural elements to different blast types, intensities and stand-offs.

Capabilities

ATR has extensive experience in modeling and simulation of the effects of explosion damage to structures, with and without mitigators, in water, air and soil. Our analytical approach features a specialized coupled Euler-Structural code that is directly applicable to blast loading on structures through any medium. We have also designed, evaluated, and tested various damage mitigation materials for protecting buildings or other structures of the US Navy and other branches of the DoD. ATR's calculations, simulations, and mitigation strategies can leverage the efforts of A&E firms responsible for the design or protection of structures facing blast threats.

Improvements over Currently Used Techniques

ATR's coupled hydrocodes provide an unusually flexible and powerful framework for predicting blast loads on all sides of a building, and loading on multiple structures in close proximity to each other. The effects of after-burn from internally detonated explosives can also be predicted. ATR uses analytical methods derived from full simulations in order to provide damage estimates under additional scenarios at low cost. Our experience with military blast mitigators informs and bolsters our methods to evaluate and optimize protective countermeasures.

Methodology

- * Perform vulnerability assessments
- * Develop building damage models
- * Perform calculations to determine the dynamic response of buildings
- * Assess measures designed to mitigate specific aggressor threats

Blast Against a Steel Structure

