Southwest Research Institute®

KEYWORDS

Weapons Effects

Terminal Ballistics

Penetration Mechanics

Armor Mechanics

Material Response

Armor Materials

Numerical Simulation

Transient Dynamics

Transient Data Collection/Analysis

Computational Fluid Dynamics

CFD

Homeland Security

Computational Dynamics

Computational Solid Mechanics

Engineering Dynamics

Southwest Research Institute® (SwRI®) engineering dynamics specialists study the nonlinear response of materials (solids and fluids), structures, and natural and engineered systems – in particular, the behavior of materials and structures subjected to large deformations at high strain rates – often to failure. SwRI's integrated approach uses experimental, analytical and computational techniques to understand and solve problems for clients.

Research activities include fundamental investigations, concept feasibility, applied studies and analyses, developmental studies, and software development and applications. SwRI staff apply their depth of experience, capabilities and creativity to solve problems using state-of-the-art facilities, equipment and computational software.

Weapons Effects

- Warhead modeling
- Blast effects
- Full-scale bomb (arena) testing
- Mine blast analysis and testing
- Chem-bio agent defeat
- Structural dynamic analysis
- Design trade-off analysis
- Transient loads structural testing
- Fluid-structure interaction
- Fragility function development
- Security engineering
- Safety analysis

Terminal Effects

- Penetration mechanics
- Armor mechanics
- Armor design and testing
- Hypervelocity impact analysis and testing
- Ballistic modeling
- IED modeling and testing
- Concept and package evaluation
- Product improvement
- Birdstrike and foreign object testing

Materials Response and Characterization

- Dynamic loading and material deformation
- Armor and penetrator materials
- Computational constitutive modeling
- Failure initiation and propagation

Computational Fluid Dynamics

- Parallel computing
- Code development
- Uncertainty analysis
- Fluid-structure interaction
- Multiphase flow
- Free surface flow
- Subsurface flow
- Particle/droplet dynamics
- Dispersion processes
- Turbomachinery analysis
- Gas dynamics
- Space weather
- Turbulence modeling

SwRI operates and maintains the Ballistics and Explosives Range in San Antonio, a 10-acre facility for conducting a wide variety of experimental programs including explosive loading hazards evaluation and mitigation, foreign object damage, ballistic impact, armor testing and hypervelocity impact. SwRI also operates a remote ballistics and explosives range, where the explosive limit is 1,000 pounds (TNT equivalent). Experiments range from improvised explosive device (IED) tests on full-scale vehicles, to 500-pound Air Force bomb tests on simulated bunker targets, to detonations of up to 1,250 pounds of ammonium nitrate/fuel oil (ANFO) simulating terrorist threats on buildings.

State-of-the-art hydrocodes and computational fluid dynamics (CFD) codes are used routinely to analyze and solve problems for clients. Three Beowulf cluster systems support SwRI's computational activities.

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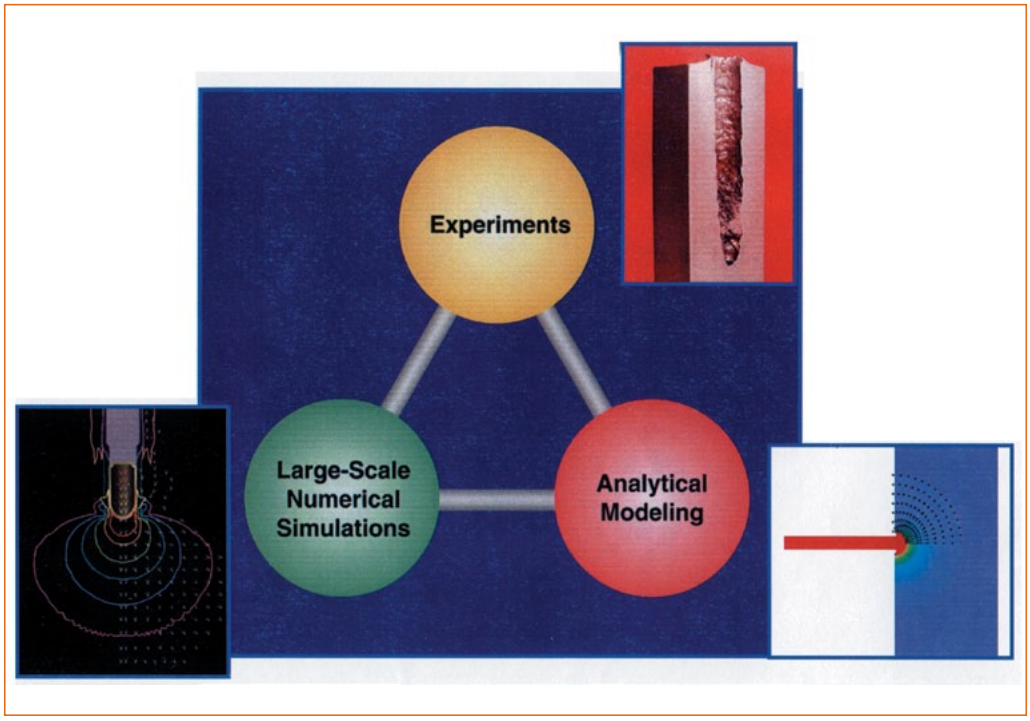
Sectioned aluminum targets after impact by a 7.62-mm APM2 bullet



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SwRI staff use an integrated approach to understand and solve client problems

Southwest Research Institute is an independent, nonprofit, applied engineering and physical sciences research and development organization using multidisciplinary approaches to problem solving. The Institute occupies 1,200 acres in San Antonio, Texas, and provides more than 2 million square feet of laboratories, test facilities, workshops and offices for more than 3,000 employees who perform contract work for industry and government clients.

We welcome your inquiries.

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