

# Fragmentation & Debris Dispersion Measurement & Prediction

## KEYWORDS

Debris Dispersion

Debris Launch

Roll and Ricochet

QD Evaluation

Hazards Analysis

Fragment Loads

Accident Forensics

Fragment Hazards

Explosive Debris

Homeland Security

**P**rotective structures must be designed to withstand blast and fragments or structural debris. Southwest Research Institute (SwRI) has long been involved in the measurement and prediction of explosive debris launch characteristics and dispersion. The SwRI Engineering Dynamics Department combines experimental and analytical capabilities to develop debris prediction software, validated with data, that can be used to conduct quantity-distance (QD) evaluations or explosive accident forensics.

### Capabilities

- Measurement and prediction of debris throw and dispersion
- Measurement and prediction of debris launch parameters
- Scale model analysis and testing
- Software development and validation
- Roll and ricochet effects on debris dispersion
- QD evaluation per established safety regulations

### Experience

- Facility siting studies
- Development of DISPRES software for QD evaluation
- Aircraft shelter hazards analysis
- Debris throw analysis for accidental explosions
- Prediction of fragment loads on structures

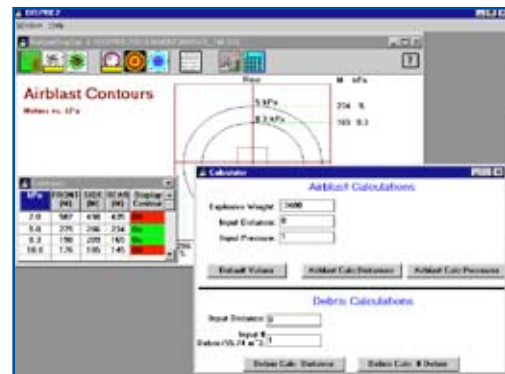
### Facilities

- Ballistics and explosives test range
- Remote test sites
- Testing up to 1000 lbs HE
- Fabrication and machine shop facilities



1/20th scale model of aircraft shelter

D005046

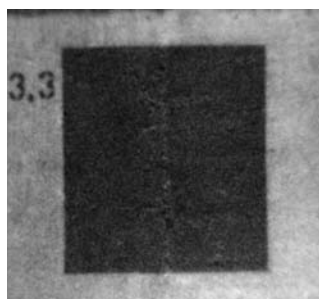


D005118

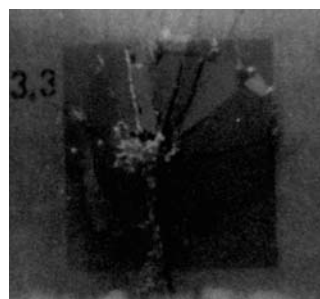
Debris dispersion software



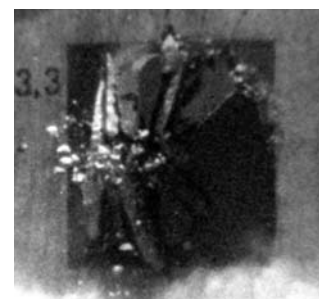
D005119



D005054



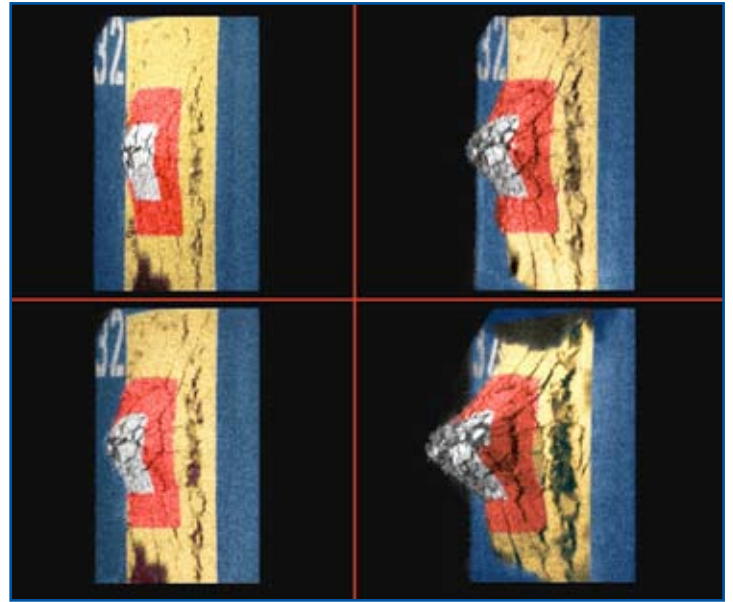
D005058



D005059

Full-scale wall fragmentation test

*SwRI Engineering Dynamics Department staff members analyze the explosive effects of bare and cased charges including structural breakup, debris throw, air blast, and scaling.*



D004966



*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 3,300 employees who perform contract work for industry and government clients.*

**We welcome  
your inquiries.**

**For additional  
information,  
please contact:**

P. A. Cox  
Staff Engineer  
(210) 522-2315  
pcox@swri.org

Scott A. Mullin  
Manager, Ballistics and Explosives Engineering  
(210) 522-2340  
smullin@swri.org

Engineering Dynamics Department  
Mechanical and Materials Engineering Division  
Southwest Research Institute  
6220 Culebra Road • P.O. Drawer 28510  
San Antonio, Texas 78228-0510

Southwest Research Institute Website: [www.swri.org](http://www.swri.org)  
Engineering Dynamics Department Website: [www.engdyn.swri.org](http://www.engdyn.swri.org)