

Enabling Penetration Technology

OBJECTIVE

Improve survivability & functionality of penetrators and their components against hard and deeply buried targets; while, mitigating risk in advanced warhead development.

Sandia National Laboratories has teamed up with Army Corp of Engineers ERDC to conduct a series of instrumented penetration and perforation experiments.

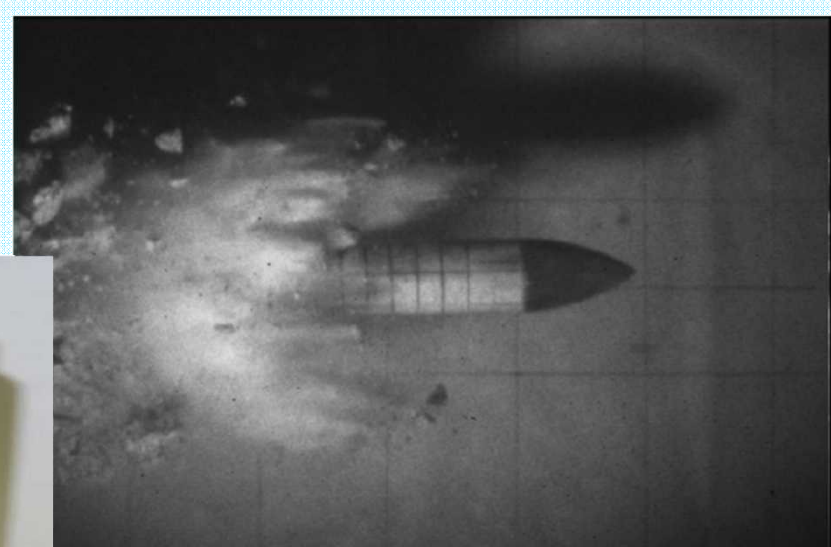
These tests provide an important resource for understanding penetration phenomenology and have led to advanced designs of Sandia's jointed utility penetrator and 3 AMP instrumentation package.

Conduct tests of subscale utility penetrator at conventional velocities to mature technology and provide greater understanding of penetration phenomenology.

Mobile gun testing of scaled penetrators have been a valuable resource for military and non-military projects.



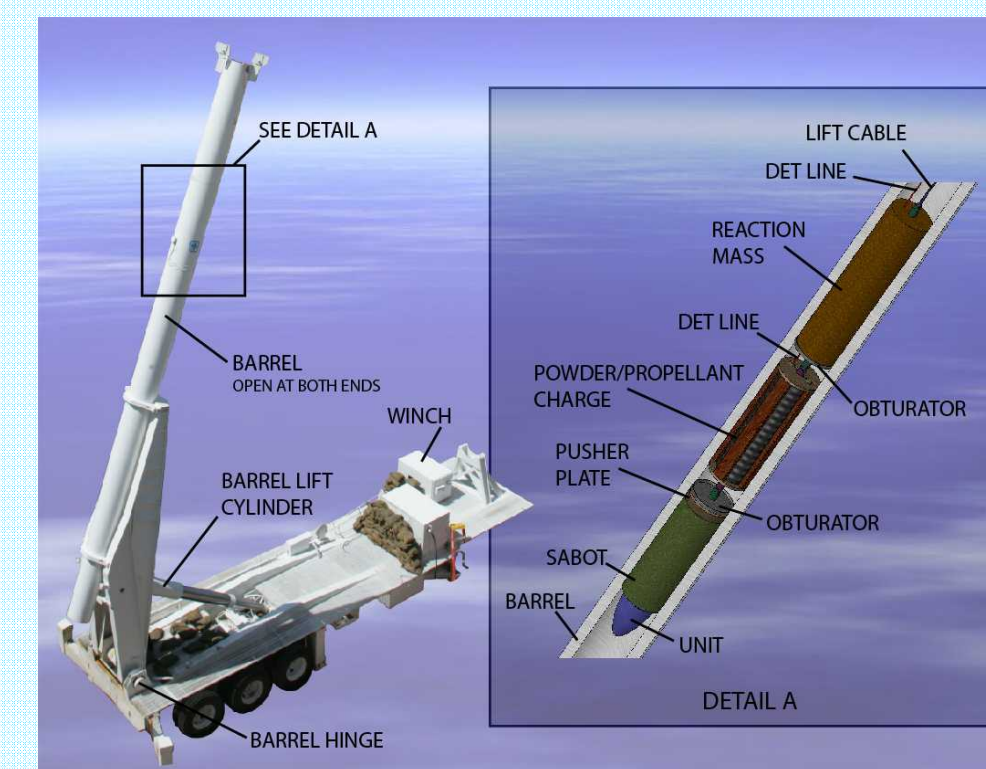
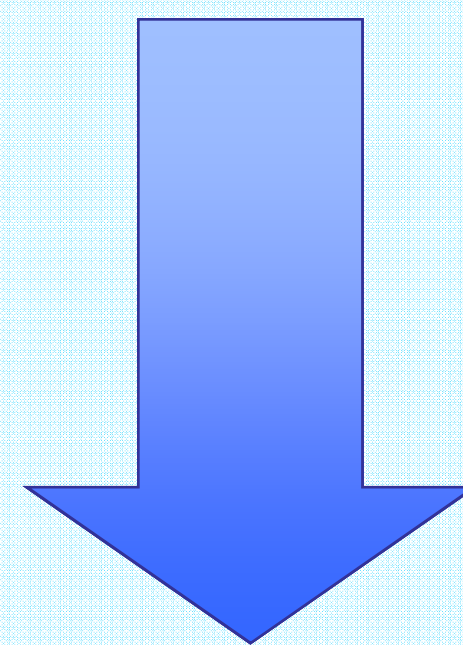
3 AMP instrumentation package



Penetrator exiting perforated target



Post test ERDC target



Davis Gun



Image motion capture for gas gun test



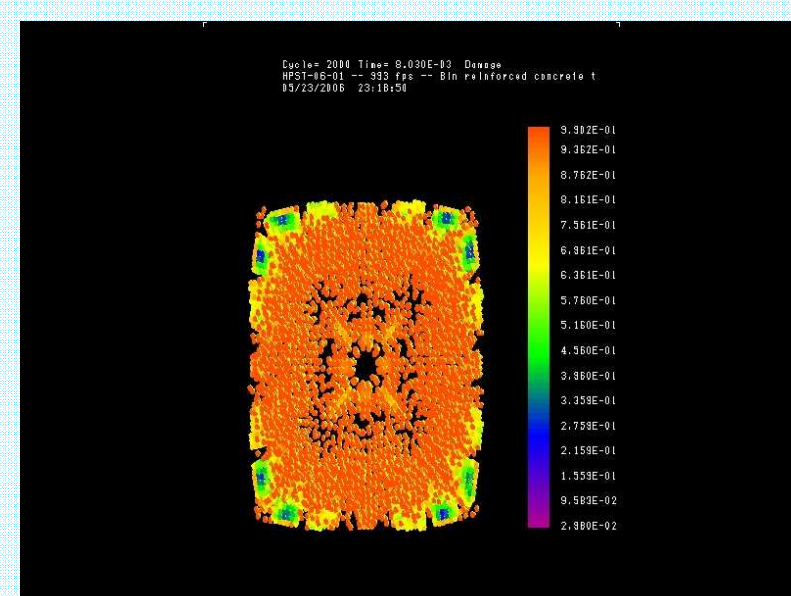
Gas Gun

Scaled penetration testing is being used to advance the state of the art in numerical analysis codes. Code benchmarking tasks focus on the challenges of modeling penetration and perforation events. Codes include: Alegra/Shism, CTH, EMU, Epic, PENCURV, Presto, RBPen and Zapotec.

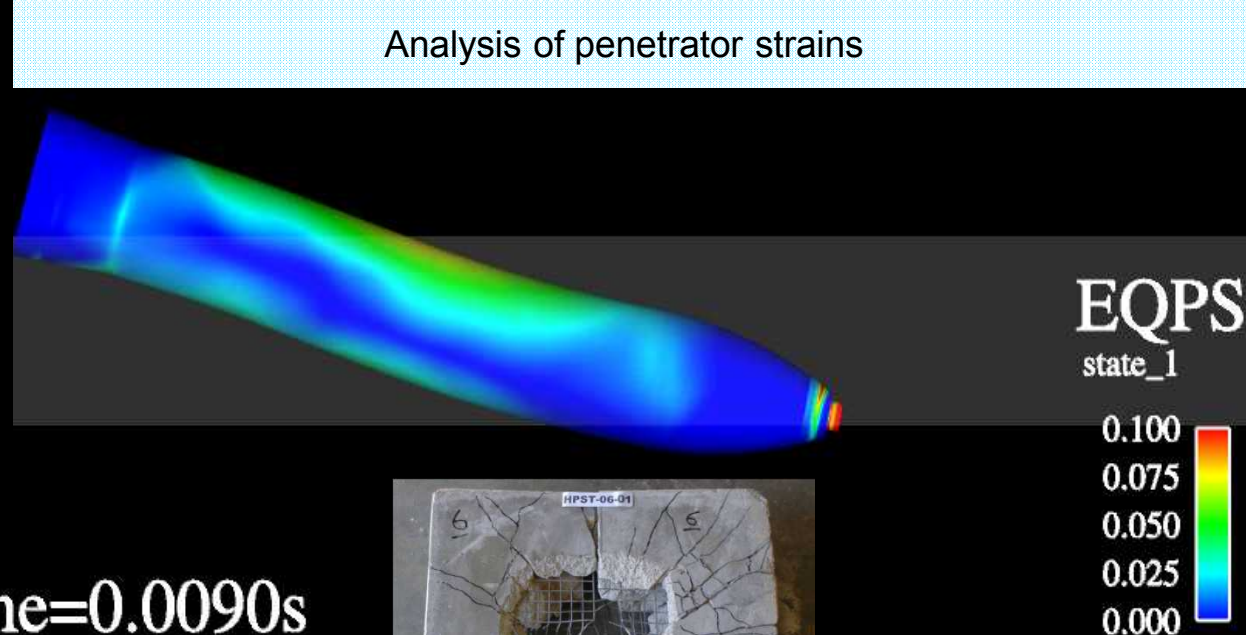
Acquire test data to improve analytical codes for predicting penetrator performance.

Sandia's confined Split Hopkinson Pressure Bar provides dynamic material data characterization under hi-strain rates.

Enhanced numerical modeling techniques show promise for capturing material behavior. These include the Sandia developed EMU code and the Sandia geomodel.

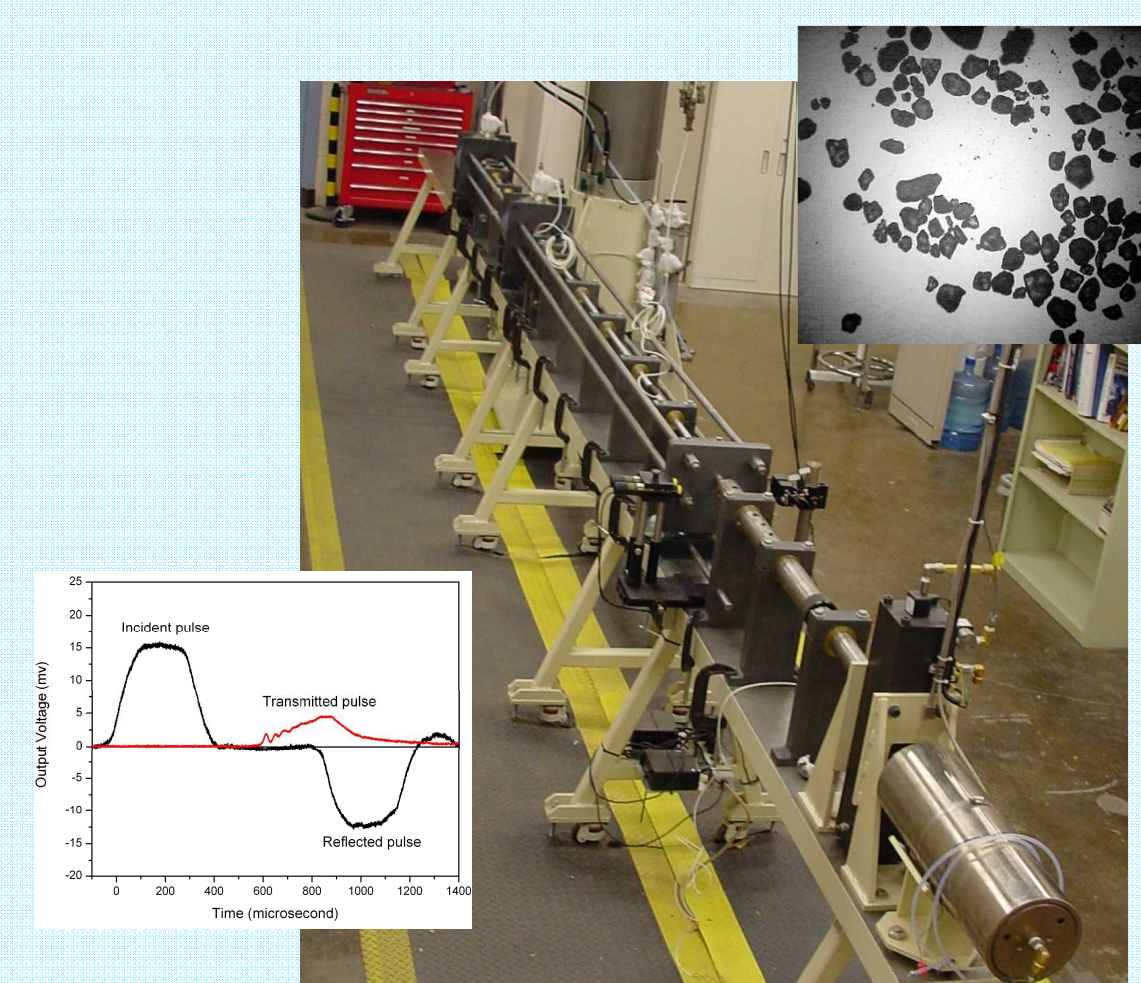
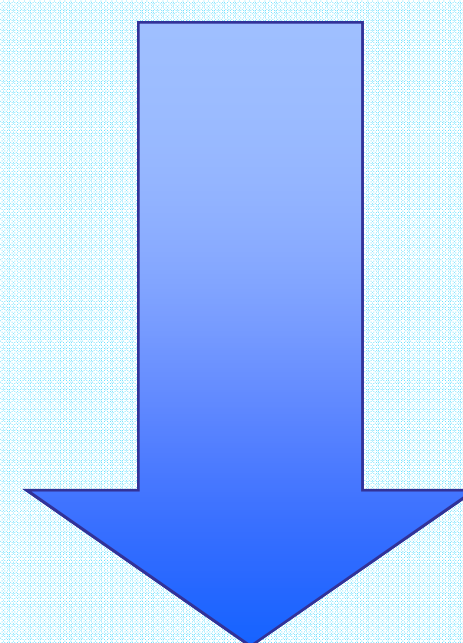


Simulation of target damage

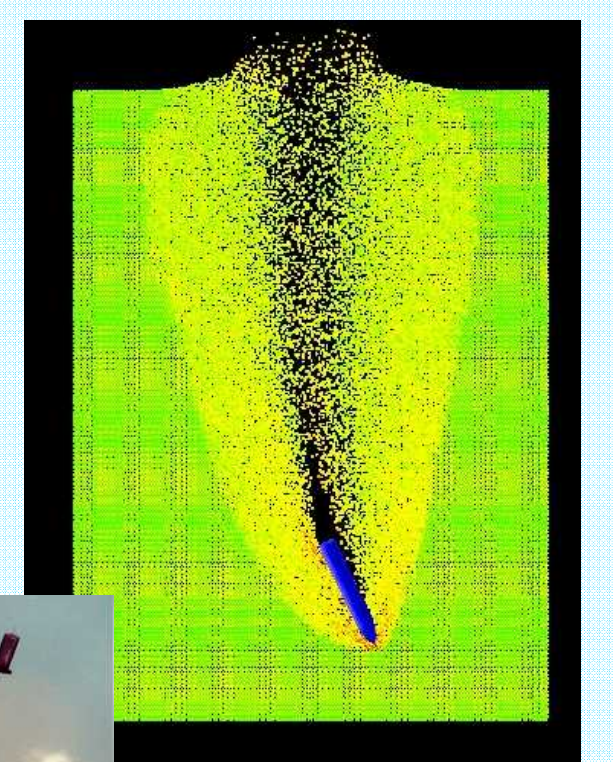


EQPS state 1

Time=0.0090s

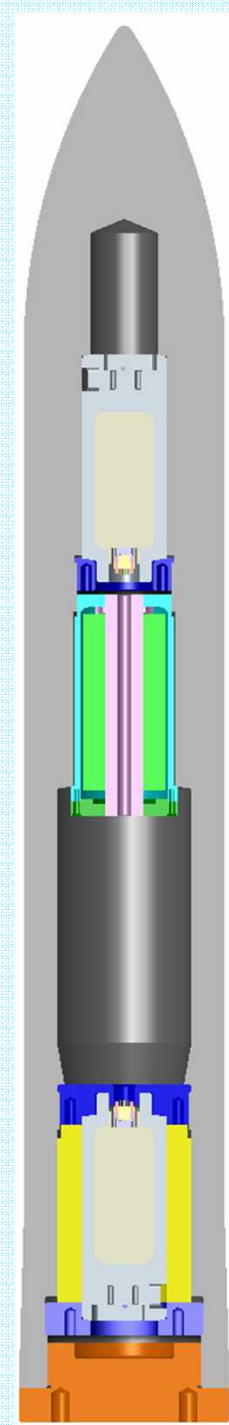


Confined SHPB



EMU simulation

Demonstrate survivability and functionality of improved penetrator designs against challenging targets.



Instrumented Penetrator

Lessons learned from scaled penetrator work have been used to support sled and gun testing of full scale systems.

High g instrumentation developments improve environmental characterization with onboard measurements.



Full Scale Sled Test



Davis Gun Test

Project Manager/Org/Phone: Douglas Dederman / 5431 / (505) 844-7458