

Operational Verification of the VIMF

Dr. Christopher H. Conley
Cadet Richard A. Hutchison

Department of Civil & Mechanical Engineering
United States Military Academy
West Point, New York

ARL Sponsor: Dr. Patrick Baker

Chief, Explosives Technology Branch
Terminal Effects Division
Weapons and Materials Research Directorate
U.S. Army Research Laboratory
Aberdeen Proving Ground, Maryland

ABSTRACT:

The Vertical Impulse Measurement Fixture (VIMF) is a test facility that has recently come on line at the Aberdeen Proving Ground (APG) site of the Army Research Laboratory (ARL). The facility's name reflects one of the major motivations behind its design: the measurement of the impulse generated by land mines. Little data is available for land-mine generated impulses as compared to the data available for air and under-water blast. On the other hand, there is considerable data available on the casualties and loss of equipment that results from land mine detonations. Beyond characterizing land-mine generated impulses for use in simulations, the facility is well suited for controlled testing of vehicle design and retrofit concepts.

In this project, an "as-built" CAD model of the VIMF was created. This CAD model can be used to generate "as-built" drawings that are commonly archived on large facilities. In this case, though, the CAD model was the basis for numerical models for simulations of the VIMF's response. The initial simulations were used to help verify the operational readiness of the facility.

In addition to presenting the results of these VIMF operational simulations, some preliminary design work on the guide-rail will be reviewed. The guide-rail is the major moving component of the fixture. This report will conclude with preliminary results from structural response calculations that are being made to assist in setting operational limits for the VIMF.

KEY WORDS: Land mine, impulse, numerical modeling, CAD, vehicle, retrofit

CONTACTS: Dr. C.H. Conley, DCME, USMA, West Point, NY, 10996
Phone: (845) 938-4092; Email: ic7188@usma.edu

Dr. Reed Skaggs, ATTN: AMSRL-WM-TB (Skaags)
Phone: (410) 278-9329; Email: rskaggs@arl.army.mil