

Shear Mechanisms of Depleted Uranium Alternative Penetrators

Cadet Daniel P. Mahoney
Department of Civil & Mechanical Engineering
United States Military Academy
West Point, New York

ARL Sponsor: Mr. Tim Farrand
Army Research Labs
Aberdeen Proving Grounds, Aberdeen MD

ABSTRACT:

The overall objective of this AIAD was to experimentally determine the effectiveness of certain penetrators when compared to their depleted uranium counterparts. There is a large amount of stigma surrounding the use of depleted uranium (hereafter DU) due to side effects after battle. The Army is currently researching various material combinations to find a material to create a penetrator out of that would be as dense as DU and still maintain the same shearing ability for self sharpening effects.

I had several roles in this process, ranging from the most basic of tasks to the more complex. In my first week there, I helped to set up our test shots. This involved securing the witness plates and impact plates to the test bench, ensuring the electrical connections were working, and helping to load the shot. Soon after, I got to see how the fast frame photography gave us the speed of the round, along with the pitch at a point in the trajectory so that we could track the debris on the far side of the target. In my final week there, we took the samples, cut them down, polished them, and then analyzed them under a scan electron microscope to identify shear mechanisms in the grain boundaries for the penetrator material.

This AIAD was of particular interest to me because it was directly related to material we learned in ME380, Engineering Materials. Due to the knowledge I had prior to coming to this AIAD, I was not just learning while I was there, but applying what I had learned during the academic year to assist testing that was in progress. The research we conducted seemed very relevant to the Army, and I would love to return there some day.

KEYWORDS: shear mechanism, depleted uranium, penetrator, scan electron microscope

CONTACT: Mr. Tim Farrand, Team Leader, Small Arms Fire Division, Army Research Labs, Aberdeen Proving Grounds, MD, Tel: 410-278-6065, Email: farrand@arl.army.mil

Mrs. Elanor Deal, Range Manager, Army Research Labs, Aberdeen Proving Grounds, MD, Tel: 410-278-6953, Email: deal@arl.army.mil