

In-Flight Armature Diagnostics
Utilizing High-Speed Cinematography

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ABSTRACT:

Projectile analysis is a critical tool for weapons research. Prior to fielding any new weapon, standardized projectile specifications must be determined. High-speed cameras are often used to analyze projectiles as they leave the muzzle of a weapon; however, an electromagnetic rail gun's muzzle arc is too bright and does not allow the armature projectile to be captured on film. The mission of this project was to successfully collect imagery of a C-Type Armature upon exit from a Small Caliber Launcher (SCL) Rail Gun in order to further analyze projectile deformation, destruction, orientation, and condition upon exit from the weapon's muzzle. The rail gun is the newest in weapons technology that will be available to military forces in the near future. In order to develop appropriate armature specifications and geometry, the SCL Rail Gun is used to test various machined armatures. One aspect of armature analysis is the orientation and condition upon exit from the weapon's muzzle. In order to successfully gather imagery of the armature leaving this rail gun, an auto-darkening lens was joined with a high-speed camera. With proper testing procedures and calibration, the project was successful in obtaining footage of various armatures leaving the muzzle of the weapon. This footage is the first successful imagery captured without the use of x-rays or infrared camera. Precision and accuracy are critical for weapons; therefore projectile analysis will play a key role in the development of rail gun weapons prior to production and deployment among the armed forces.

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