Feed Tray Cover Shock Simulator

Overview
NVESD required a way to characterize the shock experienced by a weapon-mounted sight due to closure of the feed tray cover of the M240B medium machine gun and create a device to repeatedly replicate the shock in a laboratory environment. Our solution is a base that serves as the weapon receiver that features a pin hole for the feed tray cover hinge pin and slots for servomotors that open and close the feed tray cover. An Arduino controls inputs for the servomotors. Our design can be used in NVESD’s thermal chambers with light modification to the device.

Objectives
Our objective was to obtain acceleration data from the feed closure shock event and design a system that could replicate such a shock in a laboratory, particularly inside of a thermal chamber.

Approach
- Testing: Fort Belvoir, VA; two trips
- Concept generation:
  - All-servo
  - Servo-mass
  - Pneumatic
- Analysis of data in MATLAB and Excel
  - Combined SRS (Shock Response Spectrum) plot
  - Average SRS plot
- Created CAD model of prototype base
  - Printed using PLA
- Second iteration of model designed in SolidWorks
  - 3D-printed with PLA

Outcomes
Project outcome: NVESD now has a viable way (with modification, e.g. cold-weather, high-torque servos) to replicate the shock of the closure of the M240B feed tray cover on weapon-mounted sights for laboratory testing. This will allow NVESD to submit data to manufacturers in order to design around pertinent frequencies to create more robust, durable weapon optics.