NAVAL SURFACE WARFARE CENTER DAHLGREN DIVISION

Captain Joseph McGettigan

Commander

NEWS RELEASE

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Electromagnetic Gun Facility Operational with Successful First Test

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DAHLGREN, Va. – A significant milestone in the advancement of naval gun technology occurred with the successful test and standup of an electromagnetic (EM) railgun facility at the Naval Surface Warfare Center Dahlgren Laboratory on October 2.

Under the auspices of the Office of Naval Research (ONR), engineers at the laboratory fired a low energy shot, the first in a series of tests required to bring the facility online. Using a 90mm bore launcher with a copper rail and a power plant capable of delivering 8 mega joules (MJ) of muzzle energy, a 2.4kg projectile was fired at 830 meters per second, yielding an energy of 0.8 MJ.

"We are one step closer to the future of naval weaponry with the standup of this, the largest operational EM (Electro-Magnetic) facility in the Navy," said Elizabeth D'Andrea, Ph.D., program manager for the Electromagnetic Railgun at the ONR. "The recent advances in science and technology are what has made this technology feasible, as well as collaboration of scientists and engineers across government agencies, industry and the branches of service."

"With the potential to deliver lethal, hypersonic projectiles at ranges in excess of 200 nautical miles within six minutes, a naval railgun offers a transformational solution for volume fires and time-critical strike," said NSWC Dahlgren Commander Captain Joseph McGettigan.

The Oct. 2 low-energy shot was the first in a series of tests required to bring the facility online. All systems performed well during the initial test and full capability operations are anticipated by January 2007, according to Charles Garnett, Program Manager for the Electro-Magnetic Railgun Office at NSWC Dahlgren.

As part of ONR's Electromagnetic Railgun program, the stored energy, launcher and terminal area will be increased in size to accommodate a 32 MJ muzzle energy gun by Fiscal Year (FY) 2009. This facility provides the first steps toward the envisioned tactical Navy system of 64 MJ of Muzzle Energy.

Railguns provide a capability for sustained, offensive power projection, complementary to missiles and tactical aircraft. They may be a cost-effective solution to the Marine Corp Naval Surface Fire Support requirements because of their unique capability to simultaneously satisfy three key war-fighting objectives: 1) extremely long ranges; 2) short time-of-flight; and, 3) high lethality (energy-on-target).

One important distinction between railguns and propellant-based guns is the difference in muzzle velocity. The 5-inch/54 and 5-inch/62 guns of today achieve muzzle velocities of approximately 800 m/sec. In contrast, a railgun can accelerate a projectile to hypersonic velocities of 2500 m/sec (Mach 7) and greater, enabling 200-plus nautical mile ranges within a six-minute time of flight.

Railgun research in the United States has been ongoing for more than two decades. In the 1980s, railgun research was conducted under the Strategic Defense Initiative (SDI) in an effort to develop space-based intercept of intercontinental ballistic missiles. The Army began research in 1985 to develop a mobile, ground-based electromagnetic system capable of defeating future armored combat vehicles. And it is the refurbished SDI launcher that is currently installed at NSWC Dahlgren. The Navy is awaiting delivery in 2007 of a 32 MJ railgun being built by BAE Systems.

As D'Andrea noted, it is the combination of three technology "enablers" that sets the stage for developing a long-range naval railgun. The first stems from the Secretary of the Navy decision to make the next Navy surface combatant, DDG-1000, an Integrated Power System (IPS) ship. This decision opened the door for a new generation of "electric" weapons, including railguns. With proper design, the IPS can dedicate most of the power to electric propulsion motors for high-speed operations or when the tactical situation allows, the power can be shared among various electric weapons and sensors.

The amount of power required for a railgun depends on the rate of fire. With an expected 80 MW of installed electrical power, electric warships will have ample power to supply a railgun with the 15-30 MW necessary for sustained fires at 6-12 rounds/min. It's worth noting the railgun would eliminate the need for both gun powder and explosives from the magazine. This improves ship safety and lowers logistics costs.

The second enabler is the advance in precision-guided projectile technology, evidenced by the success of programs such as Barrage, Extended Range Guided Munition, and the Autonomous Naval Support Round (ANSR). The proliferation of Guidance, Navigation, and Control (GNC) systems for Department of Defense applications suggests opportunities for smaller, more robust packages at reduced cost. These trends can only benefit the development of an affordable, hypersonic, guided projectile for railguns.

The third enabler is extended barrel life. It is the result of Army-sponsored research at the University of Texas Institute for Advanced Technology (IAT). Solutions defined at small scale in the university environment will be tested at large scale at the Dahlgren Electromagnetic Launch Facility.

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