Laser ignition may change the way guns are fired

Partnerships between the Army and small business have contributed to the development of a new ignition system that may change the way large caliber cannons are fired.

The Laser Ignition System (LIS) uses a laser, as the name implies, and requires no primer or igniter materials to fire the weapon, according to Dr. Brad Forch, Weapons and Materials Research Directorate, Army Research Laboratory. The system was developed in response to the need for fully automated loading and firing cannon systems on the future battlefield.

Much of the early development work came from small companies that participated in the program through Army Cooperative Research and Development Agreements and the Small Business and Innovative Research program.

System development was also supported by the Strategic Environmental Research and Development Program, a DoD, Department of Energy and Environmental Protection Agency partnership that focuses on cleanup, compliance, conservation and pollution prevention technologies. Use of the LIS eliminates the need for the use, storage and disposal of lead-based primers.

Currently, all large caliber Army cannons use a primer and igniter material to ignite the propellant charge. A soldier needs to load the projectile into the cannon, insert a primer into the gun breech, then fire the gun while standing at the rear of the weapon by pulling a lanyard that initiates the firing process through either impact or electrically. The LIS eliminates the need for the soldier to stand behind the weapon since the laser is computer controlled and is therefore safer.

"Laser ignition is the first major change in the way guns have been fired in the past 100 years," Forch says.

He mentions that some small arms manufactures have shown interest in laser ignition as well.

Other Army agencies in the partnership include the Army Armament Research, Development and Engineering Center and project engineering office Field Artillery Systems; Project Manager Crusader and Project Manager Paladin.

Industry and university partners included HiShear Technology Corp., General Fiber Optics, Kigre, U.S. Laser, Spectra Diode Labs, Nanotech Glass, Pacific Scientific, Princeton Scientific Enterprises, University of Iowa and Pacific Rim Engineering, Inc.

Turbocharger performs without oil

An oil-free turbocarger performed flawlessly during a recent five-hour test at Schwitzer Turbocharger, Indianapolis.

A joint project of ARL's Vehicle Technology Directorate and NASA, the research team included contractors Caterpillar, Inc.; Schwitzer, and Mohawk Innovative Technology, Inc. The team capitalized on breakthroughs in foil air bearings, tribological coatings, and computer-based modeling. Oil-free foil bearing technology offers dramatic improvements in speed, weight reduction and high-temperature maintenance-free operation by doing away with conventional bearings, lube systems and cooling.

The technology is applicable to turbomachinery systems used by the Army including diesel engine turbochargers, turbogenerators, auxillary power units, and gas turbine propulsion systems.

Engineer honored for transfer of SIDS sensor technology

Michael Scanlon, an engineer at the Army Research Laboratory, who invented an acoustical sensor pad useful in monitoring Sudder Infant Death Syndrome (SIDS), has been honored by the Institute of Electrical and Electronics Engineers (IEEE).

Scanlon, who works in ARL's Sensors and Electron Devices Directorate, will receive the IEEE's Electrotechnology Transfer award on Oct. 16 at the IEEE's Engineering in Medicine and Biology Conference in Atlanta, Ga. The award honors individuals whose contributions in a key government or civilian role led efforts to transfer federal or state-sponsored developments in advanced electrotechnologies to successful commercial-sector opportunities.

Scanlon co-holds three patents on the sensor along with the Army. Two companies have signed patent licensing agreements with ARL to develop the sensors for commercial applications.

One company, Sleep Solutions, plans to develop the sensor to monitor SIDS and sleep apnea. SIDS affects newborn infants who stop breathing and die for no apparent reason. A monitor can alert parents to the situation and help stimulate the infant to begin breathing again. Apnea is a condition in which affected people stop breathing for varying periods of time while asleep.

The other company, FitSense, will develop the sensor for use as a wrist-mounted monitor measuring users' heart and breathing rates, blood pressure and other physiological readings.

ARL and Scanlon share patent licensing fees and royalties and the laboratory's share goes to the employee's directorate to help fund programs.

The acoustic sensor pad is a fluid-filled bladder with a hydrophone that couples to the torso. Since the human body is mostly water, the pad acts as a fluid extension of the body to form an acoustical conduit to the hydrophone within the pad that detects body sounds. Heartbeats, breathing, motion and other physiological sounds can be detected, transmitted and monitored or analyzed for diagnostic purposes. The pad can be hand-sized or a full torso pad. It also has potential applications for medical diagnosis, patient care, and research.

Scanlon is now working in an Army program to develop the sensor to be worn by soldiers to measure their vital signs during training or in combat.

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