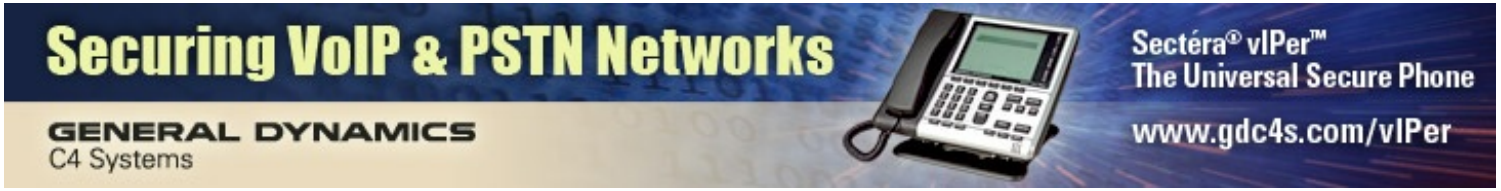

The Army's Tactical High Energy Laser Earns Its Wheels

The High Energy Laser Technology Demonstrator advances battlefield laser potential

Written by: Eric Tegler on December 16, 2011

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Boeing's HEL TD mounted on an Oshkosh HEMTT. Field testing with a low-power 10 kilowatt laser is to begin in 2012 after system verification. Photo courtesy of The Boeing Company

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The U.S. Army and Boeing have taken small but significant steps this year in making tactical battlefield laser weapons a reality. The Army's Space and Missile Defense Command's (SMDC) High Energy Laser Technology Demonstrator (HEL TD) ended 2011 in testing at White Sands Missile Missile Range in New Mexico.

During the summer, the HEL TD team completed integrating a ruggedized beam control system (BCS) and other critical hardware on an Oshkosh Heavy Expanded Mobility Tactical Truck (HEMTT) which the Army uses to move fuel and material and for recovery missions. A low power laser was fitted in August after the system's arrival at White Sands.

The BCS – which finds/tracks targets and points/focuses the laser beam on those targets – lies partly within the box-like structure atop the HEMTT, but its most obvious feature is the beam director, a rotating turret that extends above the roof of the vehicle when it engages targets.

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> *And eventually, the Army expects the system to track and destroy small munitions such as rockets or mortar shells at close range on the battlefield. Such short-range projectiles are airborne for just seconds, providing little time to take cover. Using heavy gunfire to counter them can inadvertently hit friendly forces in the process. HEL TD's laser beam, moving at the speed of light, has the potential to "hit targets with unprecedented precision and swiftness," according to Boeing.*

HEL TD is one of a number of directed energy weapons demonstrations currently running for all three services. Examples include the Joint High Power Solid State Laser (JHPSSL), funded by the Joint Technology Office and the Army to produce a lab-based 100 kilowatt technology demonstrator; and the High Energy Liquid Laser Area Defense System (HELLADS), a DARPA-funded program to demonstrate an actual 150 kilowatt laser weapon system.

JHPSSL is about midway through a three-year program, while HELLADS is approaching demonstration of a 50-kilowatt unit cell demonstration. That is expected to be followed by a two-year phase to build and demonstrate a full 150-kilowatt capability, then transitioning the technology to the Air Force to test on an airborne platform.

HEL TD began in 2007, with Boeing awarded a Phase 1 contract that included preliminary system design. Phase II, awarded in 2008, comprised the system build and initial test. The solid-state laser technology employed for HEL TD shares characteristics with those described above and with the Navy's Free Electron Laser (FEL) program. However, Boeing spokesperson Elizabeth Merida points to the USAF's Airborne Laser (ABL) program which placed a high-power laser aboard a 747 (YAL-1) and its Advanced Tactical Laser (ATL), which put a high-energy laser on an AC-130 gunship, as important predecessors to HEL TD's tracking system. Some of the same engineers who worked on ATL are at work on HEL TD.

Completion of the integration of the low-power laser, BCS and other hardware on the

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HEMTT, “was significant for us in terms of the development and evolution of this system,” Boeing’s Merida says, “because it meant we were then ready to take the system from the laboratory out into the field as a coherent whole.”

Neither Boeing nor SMDC is prepared to discuss the results of the testing thus far, but we know that initial test objectives included tracking and possibly lasing small projectiles using HEL TD. The tracking system is a High Power Adaptive Optic system which uses an “edge track algorithm” to track targets.

In basic terms HEL TD’s BCS will acquire, track and select an aim point on a target during the same timeframe in which the system receives the laser beam from the laser device. It then reshapes, aligns it, and focuses it on the target via mirrors, high-speed processors and high-speed optical sensors.

> *Obviously the HEMTT is too cumbersome for the sort of tactical scenarios the Army envisions, but its choice as the HEL TD platform is based on the size of the laser system available at the beginning of the program. SMDC says the space available on the HEMTT also allows for the integration of a variety of future lasers as they become available. Over time, the packaging requirements should get smaller, Merida affirms.*

“Over the last decade a lot of these directed energy systems have become much smaller and more lightweight. There are still challenges in making the technology compact enough to fit on a truck type platform or fly on a small unmanned aerial vehicle.”

Plans for 2012 center on the installation and testing of a commercial 10 kilowatt laser on the platform and, with system verification complete, for a demonstration at the end of the year.

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