Backgrounder

Integrated Defense Systems
P.O. Box 516
St. Louis, MO 63166
www.boeing.com

Directed Energy Systems

Description & Purpose: The Directed Energy Systems (DES) unit of Boeing Missile Defense Systems is developing systems to address multiple defense needs and customers.

Customer: Among key DES programs are the Advanced Tactical Laser, sponsored by the U.S. Air Force; the High Energy Laser Technology Demonstrator, funded by the U.S. Army; and the Tactical Relay Mirror System being developed for the Air Force and the Office of the Secretary of Defense/Director of Defense Research and Engineering.

Advanced Tactical Laser
The Advanced Tactical Laser (ATL) program is equipping a C-130H aircraft with a high-energy chemical laser for engagements against ground targets.

Boeing completed the laser installation in December 2007 at Kirtland Air Force Base, N.M., and began firing the laser onboard the aircraft in ground tests in May 2008. In August 2008, ATL fired the laser through its beam control system for the first time, demonstrating the functionality of the entire weapon system integrated aboard the aircraft.

After conducting additional tests on the ground and in the air, the program will demonstrate ATL's military utility by firing the laser in-flight at mission-representative ground targets. The test team will fire the laser through a rotating turret that extends through the aircraft’s belly. The beam control system will direct the laser beam to its target.

ATL, which Boeing is developing for the U.S. Air Force, will destroy, damage or disable targets with no collateral damage, supporting missions on the battlefield and in urban operations. Boeing’s Advanced Tactical Laser industry team includes L-3 Communications/Brashear, which made the laser turret, and HYTEC, Inc., which provided various structural elements of the weapon system.

High Energy Laser Technology Demonstrator
Boeing has been awarded a U.S. Army contract valued at approximately $36 million to continue developing a truck-mounted, high-energy laser weapon system that will destroy rockets, artillery shells and mortar rounds.

Under the High Energy Laser Technology Demonstrator (HEL TD) Phase II contract, awarded in August 2008, Boeing will complete the design of, then build, test and evaluate, a rugged beam control system on a Heavy Expanded Mobility Tactical Truck. Boeing also will develop the system-engineering requirements for the entire HEL TD laser weapon system. Boeing successfully completed the preliminary design of the beam control system in the summer of 2008, under the HEL TD Phase I contract it was awarded in 2007.

The objective of the HEL TD program is to demonstrate that a mobile, solid-state laser weapon system can effectively counter rocket, artillery and mortar projectiles. The program will support the transition to a full-fledged Army acquisition program.

Relay Mirror Systems

Relay mirror systems will greatly enhance the performance of laser weapon systems by reducing the atmosphere's effects on laser beams, extending their range beyond line of sight and expanding potential laser engagement geometries.

Boeing and the U.S. Air Force announced in 2006 that they successfully redirected a laser beam to a target using their Aerospace Relay Mirror System (ARMS). This demonstration was a major step in the development of relay technology because it showed that a relay mirror system can receive laser energy and accurately and precisely redirect it to a target, extending the laser's range. The Air Force has established the ARMS hardware as a permanent test bed for relay system technology development.

Boeing is under contract to the Air Force and the Office of the Secretary of Defense to design, fabricate and test a smaller, tactical version of the ARMS payload that could be carried on unmanned aerial vehicles or balloon-like aerostats and be used with tactical ground and airborne lasers. Tactical relays would be most appropriate for shorter range missions, such as providing persistent intelligence, surveillance and reconnaissance coupled with the ability to relay lethal laser energy to a variety of targets in coastal, maritime and urban settings.

Boeing Internal R&D

Boeing is investing its own money in several efforts that promise to equip the warfighter with real directed energy capability. These efforts include Laser Avenger, a system that integrates a laser on a Humvee-based Avenger system to destroy improvised explosive devices (IEDs), unexploded ordnance (UXO) and unmanned aerial vehicles (UAVs). During laser firings conducted in September 2007 at Redstone Arsenal in Huntsville, Ala., the Laser Avenger engaged and destroyed five static ground targets representing IED and UXO threats. Upcoming tests will target in-flight UAVs.

Contacts:

Marc Selinger
Boeing Missile Defense Systems
(703) 414-6138
marc.selinger@boeing.com

Chuck Cadena
Boeing Missile Defense Systems
(703) 872-4503
chuck.cadena@boeing.com

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