

Solid State Heat Capacity Laser Mobility Platform and Pulse Forming Supply

Project Objective

To provide a Close In Air Defense advanced laser weapon system mounted on a suitable mobile platform for increased protection of the Front Line of Troops (FLOT). The system must demonstrate rapid deployability, mobility and a greatly reduced logistics tail from other laser weapon system concepts. Details of the system concept and Concept of Operations will be in compliance with requirements of the Future Combat System (FCS) program.

Team Members

- US Army Strategic Missile Defense Command (SMDC)
- General Atomics
- PEI Electronics, Inc.
- Lawrence Livermore National Laboratories (LLNL)
- Goodrich
- SAFT America, Inc.
- Raytheon



project overview

This program joins together the technologies of high performance, high efficiency Solid State Heat Capacity Lasers with the high mobility and high peak power capabilities of hybrid electric drive system to produce the first feasible concept for deploying a tactical laser to the future battlefield. In marrying these technologies together, it is now feasible to produce a high power, tactically proficient, highly mobile, self contained solid state laser system that has a very high packaging density that can fit on anything from the size of the HMMWV to that of a proposed Future Combat Vehicle. To demonstrate this concept, PEI Electronics is working with SMDC and a large team of other industry participants to build a 100 kWatt laser system, cooling system and fire control system and mount this on a hybrid electric HMMWV (originally developed under DARPA/CTE funding). This program would thereby lead the efforts to introduce high power directed energy weapon systems on the future battlefield.

Project Description

PEI Electronics is participating in this program as the provider of the mobility platform, its hybrid power train and conditioning and delivery of the laser's energy needs. In this concept, the hybrid drive system and the requirements for extremely high pulse power are being integrated so that the vehicle power train acts as the pulse forming network thereby reducing the weight of this cumbersome power source by 85%. In fact the traction battery used in the vehicle becomes the source of all the peak power needed by the laser which is then replenished by the onboard hybrid generator system. This leads to a fieldable system which is totally self contained on a single HMMWV, using no external generators or peripheral equipment and needing only diesel fuel to maintain laser operation.

To date, PEI has demonstrated the peak power capability of lithium ion batteries that meet threshold performance requirements for both vehicle and laser operation. PEI has also designed a fully integrated energy management system working directly from the traction energy system that will power the complete laser system. This integrated system has already demonstrated an energy control density of 25,000 watts per kg. resulting in a projected 7,500 pound savings in payload weight. This demonstrated performance supports the premise that the entire laser system can and will be fielded on a Hybrid HMMWV or similar vehicle.

Next Steps

This program is continuing under SMDC funding to fabricate and test the integrated energy management system hardware that is "traceable" to the final demonstratable Hybrid HMMWV mounted system. Over the next several years, progressively larger test systems will be built and tested. It is anticipated that a fully functional, Hybrid HMMWV mounted SSHCL will be field tested by the Army.

