Submitted to SPIE Optics & Photonics 2007, Photonic Devices & Applications, OP128, Optical Technologies for Arming, Safing, Fuzing, and Firing III (Thomes, Dickey)

High efficiency side diode pumped breech mount laser ignition

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Abstract

Breach Mount Laser Ignition System (BMLIS) fire control provides for the automated high repetition rate firing of munitions from remote locations. These systems have been shown to improve safety, increase reliability and reduce costs when compared to primer ignition. Lasers have been successfully used for laser ignition of howitzer propellant charges including bag, stick, and the Modular Artillery Charge System (MACS). Laser ignition systems have been fully integrated into the breech and fire control system of a number of 155mm and 105mm cannons, including the US Army's M109A6 Paladin, M198, M777 Light Weight, Crusader, and Non-Line-of-Sight Cannon (NLOS-C).

Current BMLIS lasers are lamp pumped devices. As a result, they tend to be less reliable, relatively large and (electrically) inefficient when compared to diode pumped lasers. The next generation ignition system will benefit from Diode Pumped Solid State (DPSS) laser technology. Kigre has identified new High Efficiency Side Pumped (HESP) DPSS laser devices based on new generation of athermal high-gain laser glass gain materials and innovative conduction cooled packaging. This combination portends long diode lifetime at high power levels with minimal thermal conditioning requirements. Initial breadboard testing of neodymium doped glass gain materials utilizing a HESP laser architecture was performed at Kigre, Inc. The test-bed provided high brightness laser pulses from a small, rugged and energy-efficient diode pump package with pulsed laser output power densities suitable for BMLIS applications.

Key Words: Laser Ignition, Diode Pumped Solid State laser, High Efficiency Side Pump Laser, Breach Mount Laser Ignition System

Presentation Preference: Poster Presentation

Principal Author's Biography

Christopher R. Hardy received a BS Electrical Engineering from the University of South Carolina Honors College in 1987. Mr. Hardy joined Kigre, Inc. in 1988 and became Chief Engineer in 1999. Mr. Hardy has worked on numerous IRD&E efforts and has been a Project Engineer and Principal Investigator on various Government programs.