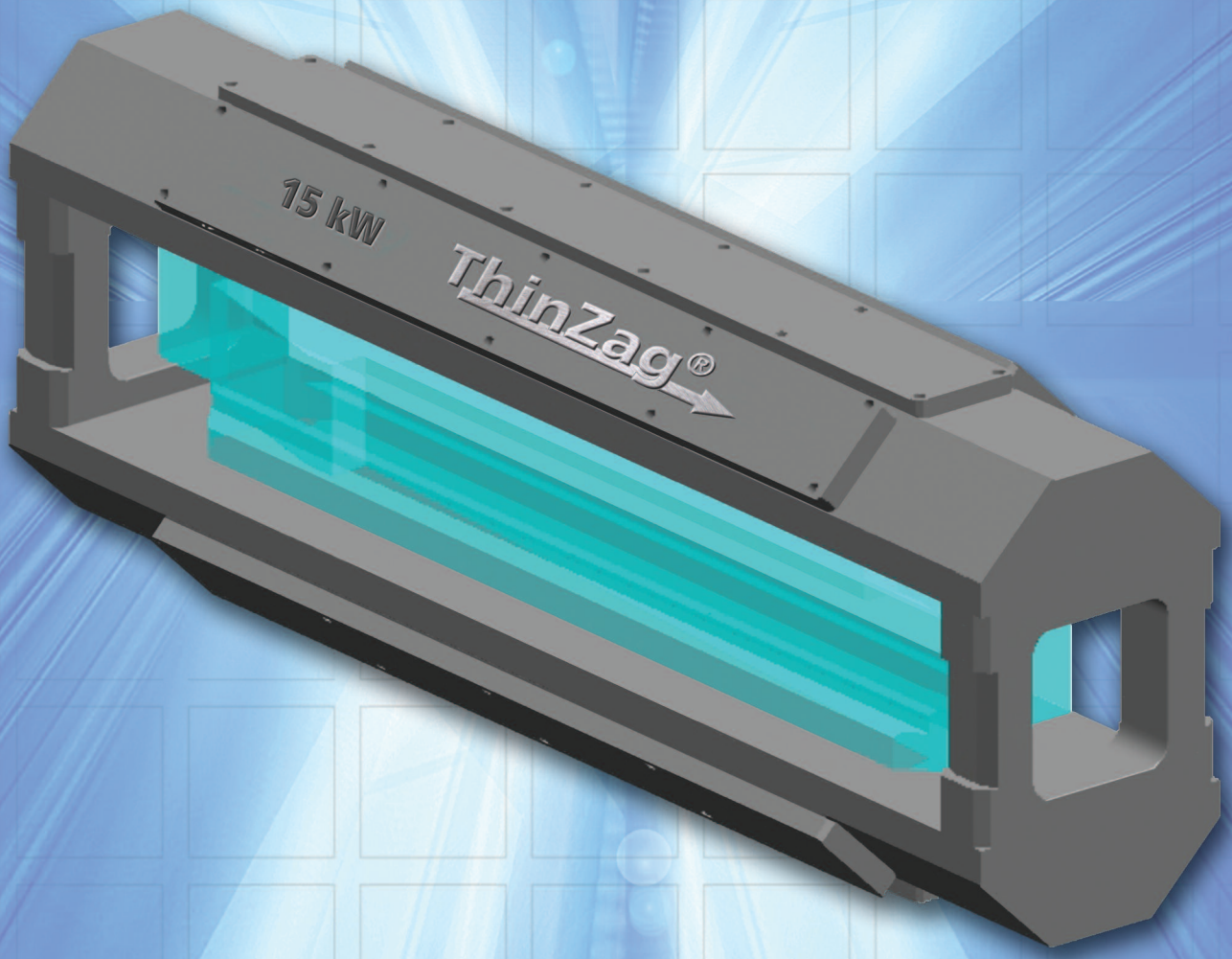
Delivering Confidence

SOLID STATE LASERS

TEXTRON Systems



ThinZag® solid state laser technology

Textron Defense Systems' engineers are developing tomorrow's precision-strike weapons today based on the company's ThinZag solid state laser technology. Shifting their designs from crystals to ceramic, our engineers now can use larger slab sizes for the gain material. While the military currently uses lasers to guide weapons in combat and to defend aircraft from shoulder-launched missiles, high-energy lasers will be used as weapons in the future — precision-strike weapons that limit collateral damage.

TEXTRON Defense Systems

THINZAG SOLID STATE LASERS

A tradition of excellence

Since Textron's acquisition of Avco Corporation and the Everett Research Laboratory in 1986, Textron Defense Systems has perpetuated a legacy of expertise in high-power laser research and development.

The 1960s, 1970s and 1980s led to the development of landmark high-power lasers such as Humdinger, Thumper and Big Bang for use by the military. The technology flourished in the mid-1980s with the introduction of the EMRLD Excimer laser.

By the 1990s, gas lasing materials were being replaced by solid state materials. That's when our scientists — with financial support from the U.S. Department of Defense — successfully developed a technique to overcome waste heat dispersion, which limited the size and power that these systems could generate.

The ThinZag approach

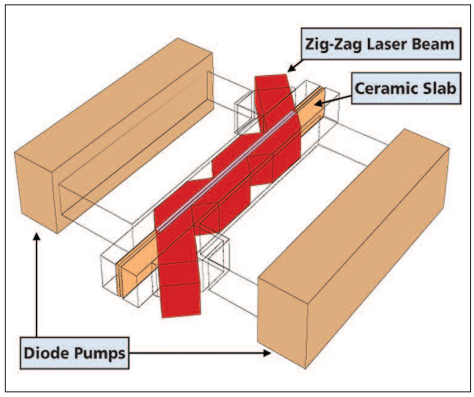
In 2004, Textron Defense Systems funded the scaling of its ThinZag laser from one kilowatt to more than five kilowatts of average power. When combined with the newly developed, mechanically robust solid state ceramic laser material, ThinZag lasers have demonstrated one, five and 15 kilowatts of continuous laser power, and have potential to produce even higher power levels from a single laser module.

The Department of Defense awarded Textron Defense Systems a contract under the Joint High Powered Solid State Laser (J-HPSSL) program in 2005 to develop a laboratory-demonstrated,100-kilowatt solid state laser. This program aimed to demonstrate that solid state lasers at a technology readiness level of three can generate 100 kilowatt output power with continuous wave operation and good beam quality. Textron Defense Systems achieved the 100-kilowatt level early in 2010, testing its J-HPSSL laboratory demonstration device at average power levels in excess of 100 kilowatts.

In 2007-2008, Textron Defense Systems was awarded contracts from the Defense Advanced Research Projects Agency/Strategic Technology Office to pursue further development of high-power laser technology under the High Energy Liquid Laser Area Defense System, or HELLADS, program, with emphasis on lightweight, compact systems.

To achieve these goals, scientists and engineers at Textron Defense Systems are combining their ThinZag laser optical configuration with the newly developed ceramic Nd:YAG laser material. Conventional lasers rely primarily on crystals as the laser medium, but ceramic Nd:YAG enables larger sizes, better medium uniformity and higher thermo-mechanical fracture strength.

Textron Defense Systems is recognized in the laser industry as the champion for large, single-module scaling by use of ceramic laser gain material, enabling system architectures that are simpler, more compact and more easily fielded.



ThinZag technology provides a unique path for scaling high-power solid state lasers to high average power for use in the most severe operational and environmental battlefield conditions.

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