



# HELSTF

High Energy Laser Systems Test Facility



## Summary

- Complete Infrastructure for Dynamic Live-Fire Open-Air High Energy Laser Testing
- Laser Lethality Testing in a Secure Simulated Space Environment
- High Explosive Static Testing for Full-Scale Targets
- Developmental and Operational Testing (DT and OT)
- Laser Material Interaction for Lethality, Survivability, and Vulnerability Testing

**Serving the warfighter and the nation's directed energy test & evaluation community as the test facility of choice for high energy laser technologies and weapon systems.**

The High Energy Laser Systems Test Facility (HELSTF), operated by the U.S. Army Space and Missile Defense Command/Army Forces Strategic Command (USASMD/ARSTRAT), is a Department of Defense Major Range Test Facility Base (MRTFB) activity. HELSTF's experienced workforce, test areas, access to extended land and air range space at White Sands Missile Range (WSMR), and infrastructure provide a one-of-a-kind capability for a wide variety of laser propagation, lethality, survivability, vulnerability, and dynamic engagement testing & evaluation.

The High Energy Laser Systems Test Facility (HELSTF) offers extensive capabilities and infrastructure for testing a wide array of laser technology programs and weapons. Located at WSMR, HELSTF has access to WSMR's 3,200 square miles of restricted land area and 7,000 square miles of restricted airspace in which to conduct static and dynamic live fire, lethality, vulnerability, and material interaction testing. HELSTF, a DoD MRTFB activity, is an approved above-the-horizon high energy laser (HEL) test range and has a close working relationship with the Laser Clearinghouse.

HELSTF represents approximately \$880 million of investment by the Army and Department of Defense in HEL research, development, testing, and evaluation that includes such unparalleled capabilities as:

**Ground Target Irradiance Measurement (GTIM) System:** The GTIM capability measures, at the target, the irradiance distribution of an incident continuous wave (CW) laser beam in the near-infrared (NIR) portion of the spectrum (1.0  $\mu\text{m}$  – 1.6  $\mu\text{m}$ ). This capability was developed to resolve a high-priority shortfall identified by the 2004 DETEC Tri-Service Study (T-SS), which developed, scoped, and prioritized directed energy (DE) test and evaluation (T&E) infrastructure shortfalls. This shortfall represented the need for a capability to provide time dependent spatial distributions of CW laser irradiance in the NIR portion of the spectrum at the target surface. The GTIM capability was developed by the Directed Energy Test and Evaluation Capability (DETEC) program and is owned and operated by HELSTF.

**Target Reflected Energy Measurement (TREM) System:** The TREM Capability measures in-band laser radiation reflected off a stationary ground target (static or spinning to emulate a dynamic target) used for testing a high energy laser weapon. This capability was developed in response to a high-priority shortfall identified by the 2004 Tri-Service Study, which developed, scoped, and prioritized directed energy (DE) test and evaluation (T&E) infrastructure shortfalls. The shortfall represented a need for a capability to measure inband laser radiation reflected off a ground target. This capability was developed by the Directed Energy Test and Evaluation Capability (DETEC) project and is owned and operated by HELSTF.

**Solid State Laser Testbed (SSLTB):** Leveraging the capability of the THEL Advanced Concepts and Technology Demonstration project hardware, HELSTF is converting components of this system to serve as a testbed for solid state laser systems under development. Initial operational capability is slated for FY10 with the insertion of the 100kW Joint High Power Solid State Laser (JHPSSL). This capability will provide a prime site for the investigation and determination of high power laser propagation effects, target lethality data collection, and engagements of short-range tactical rockets. Future efforts may include the integration of other developmental lasers/systems operating at the solid state wavelengths.

**20 kW Solid State Fiber Laser:** HELSTF owns and operates a 20kW fiber laser welder device as part of a high energy laser capability for solid state laser testing. The device is housed in container, with its ancillary equipment, that can be transported to any location to support high energy laser testing.

**Pulsed Laser Vulnerability Test System (PLVTS):** Operational since 1992, PLVTS consists of a 12-kilowatt pulsed CO<sub>2</sub> laser operating at 10.6 microns and a beam director used for multi-wavelength dynamic target

illumination. PLVTS, owned and operated by WSMR, replicates many threat tactical laser systems to support susceptibility and vulnerability testing of U.S. military systems and components.

**Large Vacuum Chamber (LVC):** The 50-foot diameter chamber can produce a vacuum equivalent to 650,000-foot altitude. It is the only vacuum chamber facility that allows entry of up to a megawatt-class HEL beam and supports testing of multiple large targets in a simulated space environment.

**Hazardous Test Area (HTA):** A fully instrumented site with remotely controlled diagnostic equipment, the HTA is located approximately 975 meters downrange and allows for safe testing of multiple full-scale tactical and explosive targets.

**THEL Static Test Site (TSTS):** A fully instrumented site with remotely controlled diagnostic equipment, the TSTS is located approximately 700 meters downrange and allows for safe testing of multiple full-scale tactical and explosive targets.

**Optical Maintenance Facility (OMF):** Provides on-site capability to characterize, clean, and install optical elements of any type.

HELSTF also offers a full range of low power lasers, Closed Circuit Television infrastructure, data collection/processing, communications, meteorological, chemical lab, cleaning facility, machine/carpenter shop, logistical services, facilities maintenance, security, and administrative support to meet mission requirements for all prospective HEL customers. With its unequalled capabilities, extensive infrastructure, dedicated team of professionals, and an outstanding location on WSMR, HELSTF is clearly the optimal range for HEL Developmental Testing (DT) & Operational Testing (OT) for HEL weapons and for private sector experimentation and testing.

HELSTF is transforming its infrastructure to keep pace with changing technologies. Modernization efforts include transforming the infrastructure from a chemical based laser technology to solid state technology; fully upgrading mission control systems; fielding a mobile diagnostic suite to support potential HEL weapon systems testing in all relevant combat environments; design of a multi-wavelength, tactical-power transportable laser light source; and design of a Battle Management, Command, Control, Communications, Computer, and Intelligence (BMC4I) test bed that will include digitized scene generation, distributed training and testing, live/virtual/constructive test environment, and open architecture. These modernization efforts will benefit the development of future HEL technologies and maintain HELSTF as the organization of choice for testing HEL weapon systems.



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