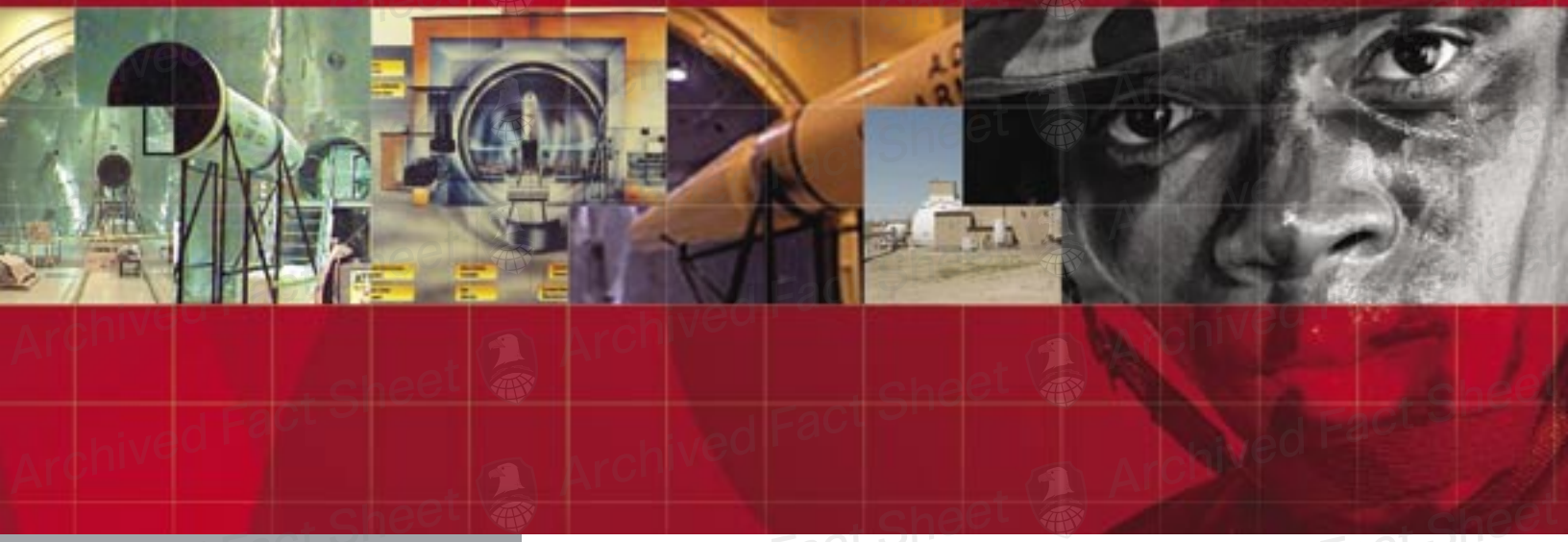
HELSTF VTS

High Energy Laser Systems Test Facility Vacuum Test System



Summary

- 50-foot diameter stainless steel sphere
- High energy laser beam entry into vacuum chamber
- 10^{-6} torr nominal vacuum in 8 hours
- Up to 50,000 pound test article weight
- Class 100,000 clean entry room
- Local and remote control rooms

Serving the warfighter and the nation as the test and evaluation organization of choice for high energy laser technologies and weapons effects in a simulated space environment.

The High Energy Laser Systems Test Facility (HELSTF), operated by the U.S. Army Space and Missile Defense Command (USASMDC), is part of the Department of Defense Major Range Test Facility Base (MRTFB). HELSTF's Vacuum Test System (VTS) is a uniquely capable and highly flexible facility for conducting tests of components and systems in a simulated space environment with or without the presence of laser energy. The VTS is able to accommodate a wide range of test articles, from payload components to full-scale space systems, for a wide variety of laser lethality, survivability, vulnerability, and effects testing and evaluation.

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Technical Center

The High Energy Systems Test Facility (HELSTF) is operated by the U.S. Army Space and Missile Defense Command (USASMDC) and is part of the Department of Defense Major Range Test Facility Base (MRTFB). Located on White Sands Missile Range (WSMR) in New Mexico, HELSTF has extensive capabilities for testing laser technologies and weapon systems. The Vacuum Test System, consisting of the Large Vacuum Chamber Facility (LVCF) and the Vacuum Beam Entry System (VBES), allows laser effects and system testing in a simulated space environment using HELSTF's megawatt-class Mid-Infrared Advanced Chemical Laser (MIRACL) or other available lasers.

The Large Vacuum Chamber Facility (LVCF) has four major components:

Large Vacuum Chamber (LVC): The LVC is a thermally-insulated, 50-foot diameter, stainless steel, spherical vacuum chamber. The operating pressure of the chamber is 10^{-6} torr and is attained after 8 hours of pumping (assuming nominal target outgassing). The system is initially depressurized down to 0.1 torr using a Roots blower/mechanical pump system and then cryopumped to the desired test operating pressure.

There is a removable, sectioned internal track platform inside the chamber that is designed to support a test article that is 15 feet in diameter by 30-feet long and weighs up to 50,000 pounds. One 30-ton and three 3-ton externally-mounted hoists are provided at the top of the LVC for target handling. Numerous "hardened" points within the LVC allow for positioning of the test article in virtually any configuration. A remotely controlled retargeting mirror allows engagement of up to 10 different targets within the LVC.

LVC Building: In addition to containing the LVC itself, the LVC building has a control room, Class 100,000 clean entry room, and target support equipment. The local control console monitors and controls chamber operations. Additionally, there is a remote control console in the Laser Systems Test Center (LSTC) for remote monitoring and control of LVC operations when required. The Test Article Transfer System is a dual track system capable of transporting a test article into the LVC Building through a movable door.

Beam Shaping Assembly Facility (BSAF): The BSAF is a thermally-insulated, horizontal, cylindrical, stainless steel vacuum chamber housing the laser mirrors used to shape and point the laser beam from HELSTF into the LVC. Available for use as a smaller vacuum chamber, the BSAF is 12 feet in diameter by 28-feet long with a 12-foot diameter removable end cap and can be pumped to 10^{-6} torr in one hour. The BSAF, used in conjunction with the Laser Beam Pipe described below, provides an ideal configuration for telescope ground calibration and focus verification.

Laser Beam Pipe: This pipe is an evacuated, elevated 1,000-foot stainless steel pipe used to transport the laser beam from the Vacuum Beam Entry System to the Beam Shaping Assembly Facility.

The Vacuum Beam Entry System (VBES) delivers a high energy laser beam from atmospheric pressure into a vacuum environment and shapes the beam so as to simulate a far field irradiance distribution in the target plane. This is done by bringing the laser beam into the Pressure Staging Assembly Facility (PSAF) through an argon-purged beam pipe. Once in the PSAF, the beam is clipped, turned, shaped, and directed through a fluoride glass window in the VBES down the Laser Beam Pipe to the BSAF for entry into the LVC. The size of the beam on target can be adjusted from focus to 1.5 m in diameter. A semigaussian beam can be delivered with a 2.8:1 peak-to-average profile.

The VTS contains a color closed circuit television system, high speed film cameras, stand-alone data acquisition systems, power supplies, strain gauges, and other instrumentation to support a wide variety of tests. Recent tests supported by the VTS include: DARPA Pegasus Shroud separation tests, Comet Fairing tests, Taurus Fairing tests, Firebird Test Article Dynamic Deployment, NASA Solar X-ray Telescope checkout, satellite vulnerability testing, unmanned aerial vehicle testing, and PAC-3 Patriot decompression testing. The VTS and HELSTF work force can accommodate almost any type of test article and successfully achieve demanding customer test requirements.

The VTS is one of the many capabilities available at HELSTF to support customer testing. HELSTF's experienced work force, organic laser systems, test areas, access to extended land and air range space at White Sands Missile Range, and robust infrastructure provide a one-of-a-kind capability for a wide variety of laser propagation, lethality, survivability, vulnerability, and dynamic engagement testing and evaluation. HELSTF is also undergoing a modernization effort that 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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