DARHT Dual-Axis Radiographic Hydrodynamic Test Facility

At the Los Alamos National Laboratory (LANL), the Dual-Axis Radiographic Hydrodynamic Test Facility, or DARHT, supports a critical component of LANL's primary mission: to ensure the safety, security, and effectiveness of nuclear weapons in our nation's stockpile. Los Alamos scientists built DARHT, the world's most powerful x-ray machine, to analyze mockups of nuclear weapons.

The DARHT Facility

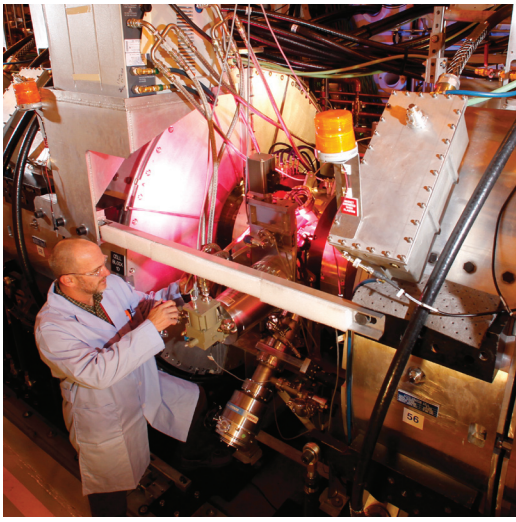
DARHT consists of two linear induction accelerators that are oriented at two right angles to one another. Each electron beam is focused onto a metal target that converts the beam's kinetic energy into x-rays. Multiple x-ray pulses produce multiple-view radiographic images of a full-scale nonnuclear weapon mockup as it implodes. DARHT's two large x-ray machines produce freeze-frame radiographs—high-powered x-ray images—of materials that implode at speeds greater than 10,000 miles an hour.

Capabilities

The main purpose of DARHT and its data-rich radiographs is to supply real-world verification for computer codes. These radiographic images are used to evaluate nuclear weapons though nonnuclear hydrodynamic testing (or, hydrotests). This full-scale mock implosion is called a hydrotest because the surrogate fuel and other components become hot enough to flow like water.

During a hydrotest, scientists detonate a "mockup" of a pit, which is the primary stage of a nuclear weapons system. The mockup consists of actual high explosives, but not plutonium. Instead of plutonium, scientists use a nonfissile surrogate material that has similar, weight, density, and other metallurgical properties so that it behaves much like the plutonium, but does not produce an actual nuclear explosion when detonated.

National Security



The concept of DARHT originated in the early 1980s as a critical tool for nuclear weapons development and stockpile stewardship. Today, DARHT is the world's most powerful x-ray machine for analysis of mock nuclear weapon implosions.

Since weapons in storage could be damaged over time by their own radioactivity, and would need replacement components, DARHT provides the radiographs that help scientists ensure weapons in the stockpile are safe, effective, and that—if ever necessary—they will perform as designed.

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