ICF Target Support Highlights

GA-C22688
September 1998

General Atomics, with our partner Schafer Corporation, serves as the ICF Target Support Contractor, providing target development and fabrication and target system engineering development to support the ICF program at five ICF Labs — LLNL, LANL, NRL, SNL, and UR/LLE. This informal newsletter contains highlights of that support for January 1998.

GA/Schafer on-site staff at LLNL, LANL, and SNL fabricated, machined, assembled and characterized about 230 targets of various kinds for experiments on Nova, Omega, Trident, and Z. We fabricated, characterized and delivered about 200 targets and target components, including micromachined hohlraums, witness plates and foams to LLNL, LANL and SNL for shots on Nova, Omega, and Z, plastic and glass microballoon capsules to LLNL, LANL and UR/LLE for shots on Nova and Omega, and flat foil targets of various materials and configurations to NRL and UR/LLE for experiments on Nike and Omega.

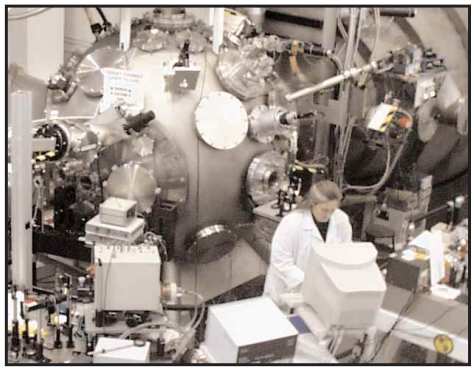

Fig. 1: The Nike laser target chamber at NRL

The "flat foil" targets for Nike at the Naval Research Laboratory actually are made in a variety of configurations for studies of Rayleigh-Taylor instabilities. These studies are done with one-sided illumination, with the incident laser beam coming from one side and the diagnostics watching the back and the side of the foil. This is illustrated in Fig. 1 showing the Nike target chamber. Our team, led by Chuck Hendricks at Schafer Corporation, has developed a variety of targets for these experiments. The targets generally consist of a thin hydrocarbon film and layers of metal or hydrocarbon foam. Because most of the research done with the targets is centered around measuring instabilities, the targets must be made to exacting specifications and characterized thoroughly. Some of the specifications include film thickness (usually between 1 micron and 100 microns), material composition, surface smoothness (no features larger than 2.5 nanometers in height), and flatness (less than 1 μm/mm). The targets may be smooth or patterned on one or both surfaces. Typical patterns include sine waves with amplitudes on the order of 100 nanometers and periods of tens of microns. An example is shown in Fig. 2. These targets are cast on precision quartz molds; we have a large number of sizes available and can make virtualy any configuration. After the films and foams are fabricated and characterized, NIKE Laser targets are often mounted on a polycarbonate holder similar to the one shown in Fig. 3. The frame shown is a little over 2 inches tall. The mounted film target is 2.5 millimeters wide and 12.5 millimeters long. For cryogenic experiments, NIKE targets are mounted on a small metal button similar to the one shown in Fig. 4. The button, or "target front plate" (TFP), is about 10 millimeters in diameter and 2.5 millimeters tall. Some combination of hydrocarbon films, metal foils, and hydrocarbon foam is layered on the TFP over the hole in the center for subsequent addition of cryogenic deuterium layers at NRL just prior to the Nike laser shot.

Fig. 2: Plastic film with sin(x) perturbation (0.25 μm amplitude and 12.5 μm period)

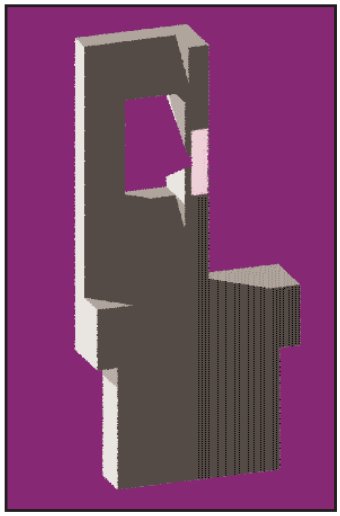

Fig. 3: Nike target mounted in Polycarbonate frame

Work supported by the U.S. Department of Energy under Contract No. DE-AC03-95SF20732.

For more information, contact Ken Schultz at GA: 619-455-4304; fax: 619-455-2399; e-mail: ken.schultz@gat.com.

Schafer

GENERAL ATOMICS