

ICF Target Support Highlights

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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 the five ICF Labs – LLNL, LANL, NRL, SNL, and UR/LLE. This informal newsletter contains highlights of that support for November 1997.

GA/Schafer onsite staff at LLNL, LANL and SNL fabricated, machined, assembled and characterized about 100 targets of various kinds for experiments on Nova, Trident, and Z. We fabricated, characterized and delivered about 200 targets and target components, including micromachined hohlraums, witness plates and foams to LLNL and SNL for shots on Nova and Z, plastic and glass microballoon capsules to 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.

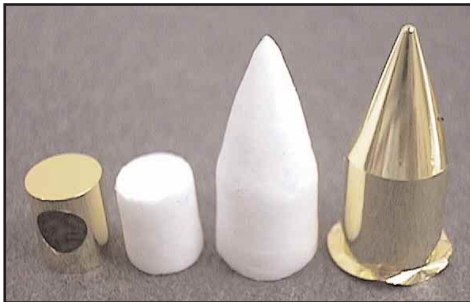


Fig. 1: Foam components and gold hohlraum cans fitted together.

In FY97 the GA/Schafer team added the capability to fabricate low density foams of specific densities, geometries, and elemental composition. Low density foam processes had been researched primarily at LANL and LLNL, and with the transfer of this technology to a production environment, all of the ICF Labs have access to this target component technology. The foam systems delivered thus far have been polystyrene and TPX (poly1-methyl-4-pentene). The foam geometries have included cylinders, tapered cylinders, annuli, and thin (800 to 300 micron) circles and squares. Diameters have ranged from 3 to 27 mm, densities 7 to 50 mg/cc, and some foams have added molybdenum (an x-ray diagnostic). In FY98 the number of requested components and the difficulty of fabrication are increasing. An example is the “Javelin” target designed by Rick Olsen to provide insight into

radiation transport in Z targets at SNL. The target consists of a tapered central hohlraum with a low density foam insert, an on-axis secondary hohlraum also with a low density foam insert, and a gold retaining washer. The close fitting foam inserts were made from TPX foam having a density $<10 \text{ mg/cm}^3$ (Fig. 1).

GA fabricated the gold hohlraums with walls only $2 \mu\text{m}$ thick. Diana Schroen-Carey at Schafer fabricated the foam inserts by dissolving the polymer in a heated solution, pouring it into a precision mold, cooling the solution to precipitate the polymer and solidify the solvent, and finally removing the solvent by a freeze drying technique. Schafer scientist Tom Alberts assembled the target at SNL. The copper mandrel was leached from the gold in a nitric acid bath, leaving a thin walled tapered hohlraum cylinder. The low density foams were handled with horse hair tweezers and delicately inserted into the hohlraum components. Tom assembled and characterized the target components to a precision of $10 \mu\text{m}$. To complete the target, SNL staff mount the assembly in a slotted wafer, and string the z-pinch array of fine wires around the target (Fig. 2).



Fig. 2: A 12 degree vertical view of the “Javelin” target installed within the wire array. This view is similar to that of diagnostic instruments.

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