

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 URLLE. This informal newsletter contains highlights of that support for October 1997.

GA/Schafer onsite staff at LLNL, LANL and SNL fabricated, machined, assembled and characterized 225 targets of various kinds for experiments on Nova, Trident, Omega and PBFA-Z. We fabricated, characterized and delivered about 400 targets and target components, including 100 micromachined hohlraums, witness plates and foams to LLNL and SNL for shots on Nova and PBFA-Z, 100 plastic and glass microballoon capsules to LLNL, LANL and URLLE for shots on Nova and Omega, and 200 flat foil targets of various materials and configurations to NRL and URLLE for shots on Nike and Omega.

In the past several months we have been implementing a technique pioneered at LANL for production of thin-walled gold hohlraums having a precisely machined plastic coating. The fabrication of these thin-walled coated hohlraum mandrels is more complex than the fabrication of any other component that we have previously produced. The production sequence for these mandrels is: (1) the hohlraum mandrel is micromachined; (2) it is then removed from the diamond turning machine and is plated with a thin ($2\ \mu\text{m}$) layer of gold; (3) the mandrel subsequently is coated with a thick layer of epoxy which is hardened by heat treatment at 200°C ; (4) the mandrel is returned to the diamond turning machine for machining to produce specified epoxy thicknesses on the barrel, the faces and the flat. In order to have the mandrels turn true when they are returned to the diamond turning machine, a special fixture, patterned after a LANL concept was designed, fabricated and employed. In October, we completed fabrication and delivery of 26 thin-walled hohlraum mandrels with machined epoxy coatings to LLNL for experiments on Omega.

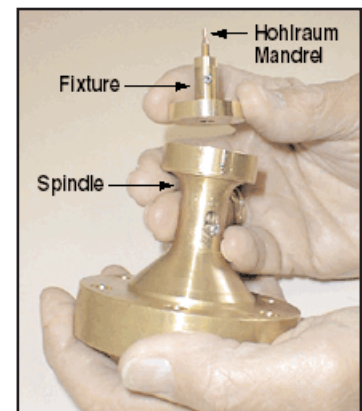


Fig. 1: Copper hohlraum mandrel in detachable centering fixture that is mounted to spindle for machining and re-machining after plating and coating.



Fig. 2: Plastic film with $\sin(x)$ perturbation ($0.25\ \mu\text{m}$ amplitude and $12.5\ \mu\text{m}$ period).

During the past month we have completed layering at Schafer Corp. of patterned silicon-doped target films for LLE. This is film which has been produced in several steps: a poly (α -methylstyrene) (PAMS) layer approximately 100 microns thick was cast on an appropriate silica $\sin(x)$ patterned substrate ($\lambda = 30$ microns, $A = 1$ micron); the PAMS film was sent to GA for coating with a layer of glow discharge polymer (GDP) silicon-doped film which was about 5 microns thick; the composite layer was returned to Schafer and an additional layer of silicon-doped polymer was applied to bring the thickness of silicon-doped material to 20 microns and to produce a smooth top surface (unpatterned). We are in the process of decomposing the PAMS layer by heating to 300°C to leave the silicon-doped material with the $\sin(x)$ pattern. This is a newly developed technique and will

certainly require further study before perfect results can be expected. However, preliminary results lead us to believe that satisfactory target films can be produced by this method.

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