

## **PRECISION MANUFACTURE OF NIF TARGETS**

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Successful Science experiments at the National Ignition Facility (NIF) require that millimeter-scale targets are fabricated, aligned, and measured with micrometer-scale tolerances, and surface roughness in the nanometer regime, spanning over six orders of magnitude in scale. Development of the novel materials required for targets including shaping and assembly into geometries required in these complex targets present challenges for manufacturing and metrology and require focused research and development. In addition the completed assemblies must accommodate features required to field the targets on the facility such as shields, coatings and alignment fiducials. Finally, as shot rate increases on NIF, there is a need to utilize more efficient fabrication techniques to ensure targets do not become the bottleneck while retaining precision. This presentation will describe how the US target development and fabrication at national laboratories in cooperation with private industry utilizes advances in precision micro-manufacturing techniques including single point diamond turning (SPDT), micro-milling, robotics, vapor deposition, optical and x-ray metrology and precision fixturing to allow for in-situ assembly and characterization of these complex assemblies. In addition, a look forward at the future challenges in manufacturing and metrology will be presented. LLNL-ABS-676293

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