

A Brief History of Target Fabrication at GA –Will We Have Targets To Allow Economically Feasible Inertial Fusion Energy?

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Target fabrication for inertial fusion applications requires development and implementation of novel processes using state-of-the-art equipment. Materials science, precision engineering and machining, and nano-scale optical and x-ray characterization are utilized. Work on targets for inertial fusion began decades ago. Current-day physics and high energy density experiments have led to sophisticated target fabrication and characterization methods.

General Atomics became involved with target fabrication in the early 1990's, as the Department of Energy's inertial fusion target support contractor. Since that time, GA has contributed to IFE programs for direct drive, indirect drive, and Z-pinch based fusion energy. Significant work was done for Inertial Fusion Energy (IFE) target mass production on the High Average Power Laser (HAPL) program for laser-based IFE as well as for Heavy Ion Fusion (HIF). The economic mass production of targets is one of the requirements for IFE, since typical power plant design studies indicate the target consumption rate is typically on the order of 500,000 per day.

This review paper will follow the history of various target designs including the ICF and IFE programs, showing why we believe economical mass-production for power plants is feasible. Recent target concepts for HIF will be noted (the "X-target") –along with potential fabrication pathways for these target designs.

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