

High Precision Assembly and Characterization System for Micro-Target

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A kind of micro-target was used for the implosion physics experiment, which consists of micro-capsule and hohlraum. The position accuracy of capsule in the hohlraum is critical to improve the spherical symmetry of irradiation field and thus to reduce implosion instability. In consideration of the stringent requirements of the position accuracy on the target components in complex three dimensional geometries, the complete assembling procedures require the implementation of a computer-controlled high-precision assembly system, which is capable of both assembling and characterizing of these targets simultaneously. In the development of the micro-target Assembly and Characterization System, we used those recent advances in motion controllers, computer assisted metrology systems, and software format exchange. The target Assembly and Characterization System consists of three groups of stacked axes, which can manipulate sub-millimeter components with submicron precision, integrated with a high accuracy online monitoring system that makes accurate target assembly and characterization of just about any design.

In this report, we will discuss the technologies that are merged to help assist the research community with micro-component fabrication. Furthermore, we also present the design of the online monitoring system, which contains two kinds of non-contact measurement system, microscopic image and laser confocal. The online monitoring system can characterize the positions of the target components during the assembly process. The system is useful for improving efficiency by allowing operators to ensure the position precision during each step of the assembly procedures.

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