Investigations to Improve the Surface Finish of Plastic Shells by Minimizing and Removing Domes*

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The presence of domes or surface features on the outer wall of plastic shells can affect target performance. Examples of this can be found for surrogate fill tube targets, where surrogate fill tube fillets can be as small as 20 μm in diameter, which is approaching the size of domes present on 0.5 mm GDP shells used for these targets. In addition, domes present on plastic GDP mandrels used for 2.0 mm beryllium shells can translate into unacceptable beryllium targets. Domes are typically produced during fabrication of thick (> 20 μm) wall shells from seed particles present on mandrel surfaces or present during the coating process.

We will present a new technique used to precisely measure and count surface domes present on shells used for surrogate fill tube targets. For surrogate fill tube targets it is important to minimize large (> 20 μm diameter) domes for these targets to have value to experimenters. We will discuss methods used to minimize large domes for production surrogate fill tube targets shot on OMEGA and present accompanying results.

We will also describe a preliminary investigation into removing domes from plastic shells using mechanical polishing and hydrogen etching. This effort focused on improving surface finish for 2.0 mm diameter, thick (> 20 μm) wall GDP shells, since this size is important for NIF (National Ignition Facility) plastic targets and mandrels for NIF beryllium targets. The recommended scheme to best remove domes from thick wall 2.0 mm shells will be discussed.

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