

Rep-Rated Target Injection for Inertial Fusion Energy[□]

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Inertial Fusion Energy (IFE) with laser drivers is a pulsed power generation system that relies on repetitive, high-speed injection of targets into a fusion reactor. To produce an economically viable IFE power plant the targets must be injected into the reactor at a rate of 5 to 10 Hz.

To survive the injection process, direct drive (laser fusion) targets (spherical capsules) are placed into protective sabots. The sabots separate from the target and are stripped off before entering the reactor chamber. Indirect drive (heavy ion fusion) utilizes a hohlraum surrounding the spherical capsule.

In our target injection demonstration system, the sabots or hohlraums are injected into a vacuum system with a light gas gun using helium as a propellant. To achieve pulsed operation a rep-rated injection system has been developed. The system will allow bursts of up to 12 targets at 6 Hz. Using the current system single shot tests have been successfully run with direct drive targets to show sabot separation under vacuum and at barrel exit velocities of ~350 m/s. These tests have also included three shot bursts of direct drive targets at a rate of approximately 5 Hz.

The next step in demonstrating the rep-rated injection system will be to perform a full 12 shot burst at 6 Hz. To achieve this goal design modifications to provide tighter tolerances and alignment in the revolver-based feed system have been made. An additional modification for this system, to be implemented at a later date, will be to incorporate simultaneous revolver loading and shooting to move beyond burst operations and show viability of long-term rep-rated operation.

The details of the existing revolver feed system along with operational data will be presented.

[□]Work supported by NRL Contract N00173-02-C-6010.