
Laser Facility Report

This report summarizes activities on the OMEGA laser system from the commissioning shot series of the Key Decision 4 (KD4) campaign to the end of FY95. The KD4 series ended with the final system acceptance tests on 2 May 1995, which demonstrated that the system met and exceeded its performance goals. These results were reported in the previous issue of the LLE Review.¹ Following this campaign, the facility priorities during the third quarter of FY95 shifted to characterization and optimization of the laser and to diagnostic deployment on the target chamber, tasks that supported the experimental campaigns planned for the fourth quarter. Laser characterization included campaigns to collect detailed energy transport data in the OMEGA beamlines, while, in the target bay, many diagnostic systems were activated and the first 10-in.-manipulator (TIM) re-entrant diagnostic shuttle was installed. In addition, a facility improvement program was executed to address many issues that came up during the KD4 campaign.

The fourth quarter of FY95 was the first full quarter of operations on the upgraded OMEGA laser. The first implosion campaign (PP2) and flat-target campaign (S1) were successfully carried out. Results from the implosion campaign are reported in the first article of this issue. The laser system underwent significant improvements, with progress made in particular on the beam-timing, on-target pointing, and focusing systems. Beam-to-beam arrival time differences were measured with photodiodes and an oscilloscope, and all beams were adjusted to match a reference beam to <30 ps. The next-generation beam-timing instrument was tested and will be deployed during the next quarter to reduce beam-timing variations to less than 5 ps. Each target-shot day, pointing targets

were shot with 60 beams to measure beam locations by comparing x-ray pinhole-camera images with calculated beam positions.¹ These shots were used to determine which beams needed to be realigned with the UV alignment system. A total of 35 of these pointing shots were taken. In addition, a number of pointing shots were taken for flat targets irradiated during the S1 campaign and also for spherical targets not located at the center of the chamber. Typical pointing results indicated that the rms deviation from the best calculated position was under 20 μm . Two focus scans were executed this quarter to characterize the UV focus performance. The final focus parameters for each beam were determined to an accuracy of $\pm 100 \mu\text{m}$, with the results of this study to be published next quarter.

Experimental campaigns this quarter resulted in a total of 150 target shots. This is consistent with plans to deliver 1000 target shots each year. In addition to the active shot campaigns, much work has been completed to prepare for the propagation of SSD laser pulses, separate backlighter sources, and timing-fiducial lasers. The SSD system and the backlighter source are scheduled for activation in the first quarter of FY96.

The shot summary for OMEGA this quarter is as follows:

Driver	187
Beamline	234
Target	<u>150</u>
Total	571

REFERENCES

1. Laboratory for Laser Energetics LLE Review **63**, NTIS document No. DOE/SF/19460-91, 1995 (unpublished), p. 99.