

High power UV laser processing of CFRP with short ns pulses and pulse splitting

M. Fujita, H. Ohkawa, T. Somekawa, T. Matsutani, Y. Maeda, J. Bovatsek, R. S. Patel, N. Miyanaga

Institute for Laser Technology, 2-6 Yamada-Oka, Suita, Osaka, 565-0871, JAPAN, +81-6-6879-8732, mfujita@ilt.or.jp

Abstract

As the use of CFRP material in industrial applications increases, achieving high cutting speed and minimizing thermal damage remain the most challenging issues for laser-based processing. Among the various parameters in laser processing, we have focused on short-nanosecond pulses to investigate cutting speed and HAZ occurrence using a high power 355nm UV Quasar® laser from Spectra-Physics. The pulse width was varied from 2 ns to 10 ns and TimeShift™ pulse splitting with burst mode technology was also tested. In single pulse mode, the laser power was changed from 6 to 60 W by adjusting the repetition rate from 100 kHz to 1 MHz. To evaluate the effect of pulse splitting we compared ablation results achieved using a single 10-ns pulse with those achieved using two 5-ns pulses and five 2-ns pulses in a single burst. The samples used were PAN-based CFRP with thickness of 250μm. We measured the time to cut through the samples and evaluated HAZ for various parameter sets. It was found that shorter (single) pulse widths and pulse splitting were both effective at increasing cutting speed and reducing HAZ for the PAN-based CFRP.