

High speed and high power laser material processing: New options for applications?

J. Hildenhagen¹, P. Bant², K. Dickmann¹

¹ Laser Center of the University of Applied Sciences Muenster, Stegerwaldstr. 39, 48565 Steinfurt, Germany

² ILT Fineworks BV, 7547 TG Enschede, The Netherlands

The increasing output power and brilliance of laser sources allows faster material processes but need novel handling technologies, e.g. beam guiding systems. Current developments dissolve consisting restrictions during the next years and finally physical properties (e.g. primary thermal conduction and heat capacity) will be the remaining limitations for process speed. First investigations should give an outlook what might be possible in the field of high speed laser material processing when the above listed technical limitations have been overcome. Therefor samples, were mounted on a fast rotating cylinder (circumferential speed up to 120 m/s) and treated with a 30 kW (cw) fiber laser. The applied laser spot diameter of 200 μm let to an interaction time of 1.7 μs and intensity of 10^8 W/cm^2 . These specifications are known from pulsed laser systems and enabled distinct surface modification or even ablation by a single laser pulse. The high speed - high power setup allows to transfer such laser parameters in a continuous process with comparable raise of application rate and may offer new options laser material processing.

