Chapter 5
Laser Micro-turning Process of Aluminium Oxide Ceramic Using Pulsed Nd:YAG Laser

Golam Kibria, B. Doloi and B. Bhattacharyya

Abstract One of the newly developed laser micromachining processes for generating micro-turn surface on cylindrical work sample is laser micro-turning process. To explore the capability of this laser micromachining process for achieving particular surface profile and dimensional accuracy of machined parts, authors considered a number of experimental investigation to find the effect of process parameters. During investigation and analysis, a number of experimental designs are applied to in-depth analyse the effect of process parameters on surface roughness (Ra and Rz) and depth deviation. The governing equations of spot and circumferential overlap were developed for investigating the effect of these overlaps on surface criteria. By adopting statistical design of experiments approaches such as Response Surface Methodology, the influence of process parameters on process performance were studied. Moreover, novel machining strategy of laser defocusing condition was also implemented for improving the micro-turning surface features. For qualitative assessment of important process parameters, scanning electron microscopic images of machined surface were analysed for better understanding the process.

G. Kibria (✉)
Mechanical Engineering Department, Aliah University, Kolkata 700156, India
e-mail: prince_me16@rediffmail.com

B. Doloi · B. Bhattacharyya
Production Engineering Department, Jadavpur University, Kolkata 700032, India
e-mail: bdoloionline@rediffmail.com

B. Bhattacharyya
e-mail: bb13@rediffmail.com

G. Kibria et al. (eds.), *Non-traditional Micromachining Processes*,
Materials Forming, Machining and Tribology,
DOI 10.1007/978-3-319-52009-4_5