# Sequential picosecond laser drilling and EDM drilling of thick section Ti6Al4V titanium alloy sheets

**Chao Wei[1*], Bocheng Zhao[1], Lin Li[1], Junlong Wang[2], Benhai Li[2], Xuefeng Wang[2]**

*1- Laser Processing Research Centre, School of Mechanical, Aerospace and Civil Engineering, The University of Manchester, Oxford Road, Manchester, M13 9PL, UK*

*2- Beijing Institute of Aerospace Control Devices, 52 Yongding Road, Beijing, 100039, Peoples Republic of China.*

*Corresponding author: chao.wei @postgrad.manchester.ac.uk*

The advantage of laser drilling is its high material removal speed because of rapid heat transfer brought about by the high energy laser beam, while it also leads to poor hole circularity, tapering, relative large heat affected zones and thick recast layers. Electrical discharge machining (EDM) drilling technology can overcome the above disadvantages of laser drilling, but its processing speed is excessively slow. In this investigation, we combined laser drilling and EDM drilling together for drilling through holes in Ti6Al4V titanium alloy plates of 2 mm and 7 mm thickness, aiming to improve hole drilling quality and reducing drilling time. A picosecond laser with a 355 nm wavelength was used to produce pilot holes. Taper, recast, hole roundness, and drilling time were compared between laser drilling, EDM drilling, and EDM/laser hybrid drilling. The result indicated that the sequential laser and EDM drilling could reduce the drilling time by 50% compared with single EDM drilling and maintained acceptable hole quality.