Feasibility of using acoustic method in monitoring the penetration status during the Pulse Mode Laser Welding process

M F M Yusof, M Ishak and M F Ghazali

IOP Conference Series: Materials Science and Engineering

2017, 238, 12006

In this paper, the feasibility of using acoustic method to monitor the depth of penetration was investigated by determine the characteristic of the acquired sound throughout the pulse mode laser welding process. To achieve the aim, the sound signal was acquired during the pulsed laser welding process on the 2 mm structural carbon steel plate. During the experiment, the laser peak power and pulse width was set to be varied while welding speed was constantly at 2 mm/s. Result from the experiment revealed that the sound pressure level of the acquired sound was linearly related to the pulse energy as well as the depth of penetration for welding process using 2ms pulse width. However, as the pulse width increase, the sound pressure level show insignificant change with respect to the change in the depth of penetration when the pulse energy reaches certain values. The reported result shows that this was happen due to the occurrence of spatter which suppressed the information associated with the generation of plasma plume as the product of high pulse energy. In this work, it was demonstrated that in some condition, the acoustic method was found to be potentially suitable to be used as a medium to monitor the depth of weld on online basis. To increase the robustness of this method to be used in wider range of parameter, it was believed that some other post processing method is needed in order to extract the specific information associated with the depth of penetration from the acquired sound.