

Influence of laser welding process parameters on weld pool geometry and duty cycle

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ABSTRACT

In pulsed Nd:YAG laser welding process, the material melts and solidifies consecutively by a peak high power laser beam. The solidification time in this process is very less as compared to that of conventional welding process. The mode of welding process is governed by the process parameters like laser energy, pulse duration, pulse frequency, power and welding speed. This paper aimed at to examine the influence of welding speed and power on weld bead geometry and performance parameters such as duty cycle, pulse overlap, energy density and bead diameter. In this contest, first experiment is conducted on austenitic 304L stainless steel sheet by varying the welding speed from 2 mm/s to 10 mm/s and second experiment is conducted varying laser power from 300 W to 3500 W. It was found from the experimental and analytical approach welding speed and laser power significantly affects on weld bead geometry, variation in bead diameter from pulse to pulse, duty cycle and effective pulse energy.

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