Closing the weld gap with laser/mig hybrid welding process

In this article, laboratory tests are demonstrated that systematically accesses the critical gap distance when welding CMn 2.13 mm steel with a 2.6 kW CO2 laser, combined with a MIG energy source. In the work, the welding speed is varied at gap distances from 0 to 0.8 mm such that the limits for obtaining sound welds are identified. The welds are quality assessed according to ISO 13.919-1 and EN25817, transversal hardness measurements are made and the heat input to the workpiece is calculated. The results show that the critical gap is 0.1 mm for a laser weld alone. With hybrid welding, this can be increased to 0.6 mm, even at a welding speed of 3.5 m/min. The maximum welding speed with the hybrid process is comparable to laser welding alone, 4.5 m/min. The measured hardness is comparable to MIG welding, and this corresponds to a 33 percent reduction compared to laser welding alone. The heat input from the hybrid process is 300 % of laser welds and 60-65 % of MIG welds.

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