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Deep penetration fiber laser-arc hybrid welding of thick HSLA steel

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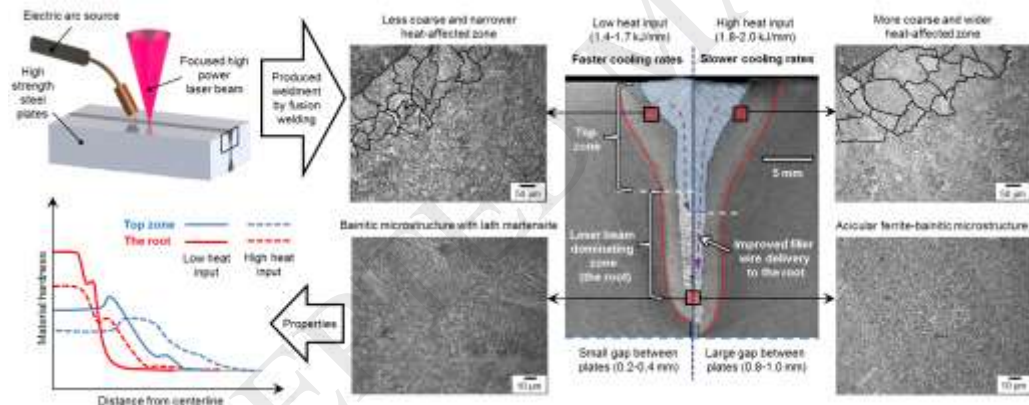
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GRAPHICAL ABSTRACT



Abstract

The present investigation addresses laser-arc hybrid welding of 45 mm thick steel with variation in a wide range of process parameters. High volume fraction of acicular ferrite formed in the upper part of the weld metal regardless process parameters. Significantly lower fraction of acicular ferrite was found in the root due to substantially increased cooling rates and the inability to deliver filler wire to this region, resulting in bainite-martensite microstructures in the root. The delivery of filler wire to the root can be enhanced by increasing the air gap between the plates. Higher heat inputs reduce cooling

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