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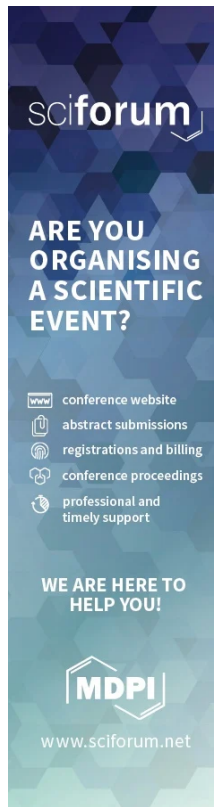
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Open Access Article

Imperfections and Modelling of the Weld Bead Profile of Laser Butt Joints in HSLA Steel Thin Plate

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In many applications that use high strength steels, structural integrity depends greatly on weld quality. Imperfections and the weld bead geometry are influencing factors on mechanical properties of the welded joints but, especially in the fatigue strength, they cause a great decrease. The proper knowledge of these two factors is important from the nominal stress approach to the fracture mechanics approaches. Studies concerning the profile and imperfections of the weld bead in laser welding for thin plates of high strength steels are scarce. In this work, these two aspects are covered for five series single and double-welded joints, butt joints in a 3 mm thick HSLA steel, welded in a small range of welding parameters. The actual profiles captured with profilometer were modeled with proposed geometric parameters achieving an adequate fit with values of the coefficient of determination R^2 greater than 0.9000. Description of imperfections includes the distributions of porosity and undercuts. The evaluation of the weld quality, taking as guide the ISO 13919-1 standard determined B and D levels for the welded series while based on the stress-concentrating effect, showed a greater detriment in those series with undercuts and excessive penetration. The analysis of variance validated the results of the different combinations of laser welding parameters and showed, for the factorial experimental design, a more significant effect of the welding speed. [View Full-Text \(/2075-4701/11/1/151/htm\)](#)

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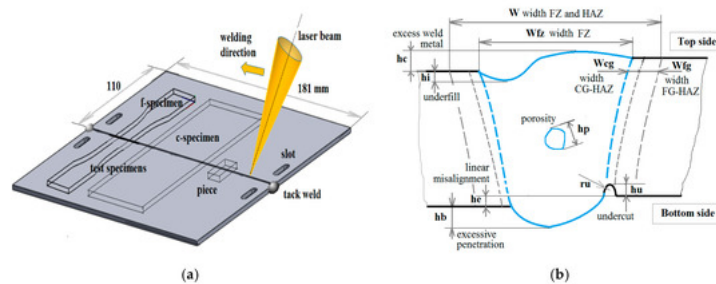


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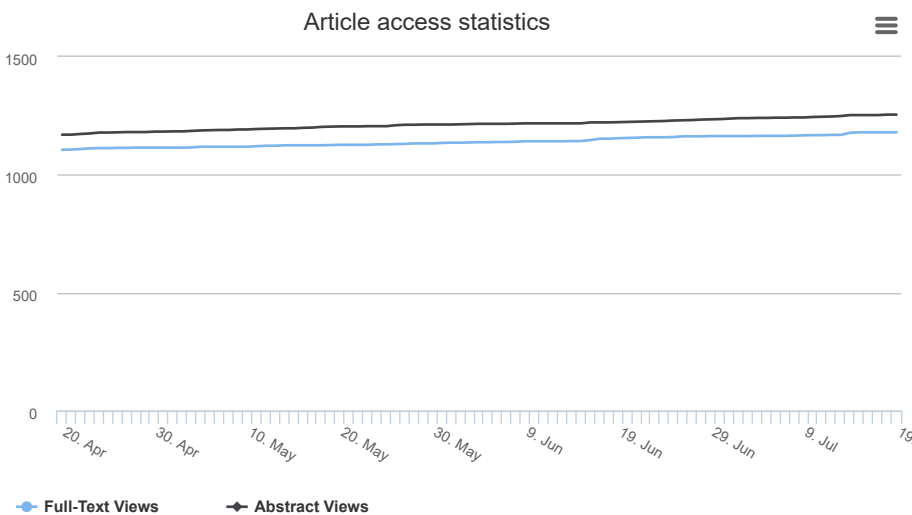
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