MAG-welding of Zn-coated steel, a process study

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Abstract

Arc welding of hot dip zinc-coated steel sheets faces a number of challenges, such as minimising the generation of spatter, blowholes and pitting. The zinc being vaporised during the welding process causes all this. These problems were focused on in a project with the task to seek ways to improve the weldability. This is the final report of the project. As a first step, a literature study was conducted to investigate reported problems and possibilities for MAG welding of zinc-coated steel sheets. To compare different welding techniques at hand, the literature study also contains papers regarding MIG-brazing. As a second part, different ways to improve the weldability of zinc-coated steel sheets were evaluated. Welding trials were performed on lap joints with no gap between the plates because it was considered to be the worst case. In a first test series the heat input was minimised. A second series evaluated the influence of the welding speed and shielding gases, and a third series studied welding with a specially developed flux cored wire “SAFDUAL-Zn”.

The results showed that minimised heat input (high weld speed) can, with some reservations, be used on thinner Zn-coatings. By increasing the heat input and creating a large weld pool (reduced weld speed) it is possible to weld Zn-coatings of different thicknesses. The weld quality and welding speed is, however, very much influenced by the Zn-coating thickness. Better results, also for thicker Zn-coatings, were achieved with the designated flux cored wire “SAFDUAL-Zn”.