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Experimental and numerical characterisation of heat flow during flame cutting of thick steel plates

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Abstract

Temperatures measurements during flame cutting of a thick steel plate and measurements of the extension of the fusion and heat affected zones and Vickers hardness after cutting have been performed. Additionally, a 3-D thermal model for simulation of flame-cutting has been developed. For the sake of simplicity, the model depends only on two parameters: i) the heat density within the flame, and ii) the heat transfer coefficient within the air gap that forms behind the cut. The results show that the model is able to properly reproduce the measured temperature curves and the heat affected zone with an input power in the same range of those reported in the literature. A process efficiency of 26.5 % is found in the steady state regime of flame-cutting.

Keywords

Flame cutting; Heat flow; Heat affected zone

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