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Microstructural Evaluation of Magnetic Pulse Welded Plain Carbon Steel Sheets

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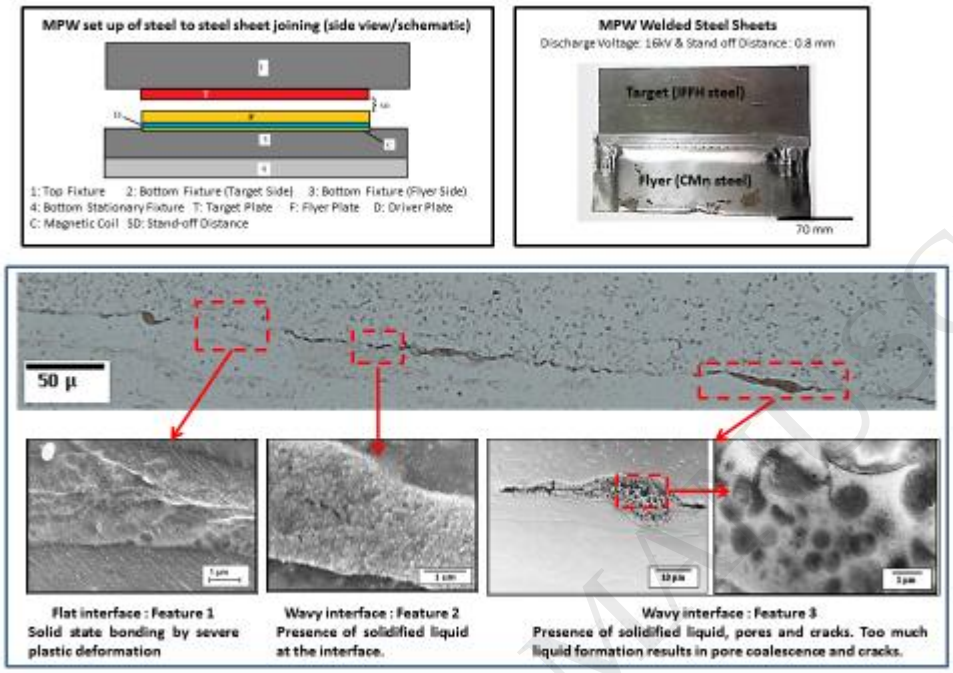
Graphical abstract



Abstract

Two plain carbon steel plates were joined by magnetic pulse welding process. The optimum condition was found to be 16 kV discharge voltage and 0.8 mm standoff distance for the present set of plates. Three distinct zones of bonding namely; solid state bonding, homogeneous liquid state bonding and liquid state bonding with pores and cracks were observed. Any appreciable changes observed were restricted within 5 µm distance from the weld line. Microstructural as well as crystallographic alterations of the structures were not detected beyond 5 µm.

Keywords: Magnetic pulse welding, steel sheets, solid state joining, liquid formation, grain orientation.

Introduction

Magnetic pulse welding (MPW) is a solid state welding process generally used for dissimilar metals joining. However, applications of MPW process in joining similar materials are also reported in literature. MPW