

ON BOND FORMATION IN MAGNETIC PULSE WELDED JOINTS

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ABSTRACT

This contribution discusses the microstructures observed in the bonding zone during electromagnetic impulse welding of similar and dissimilar alloys. Magnetic pulse welding (MPW) is accomplished by high-velocity impact between the two alloys. The impact has sufficient energy to cause the colliding metal surfaces to flow hydrodynamically when they intimately contact one another in order to promote metallurgical bonding, resulting permanent deformation with no springback. The origin of the MPW morphologies were studied by: light optical and scanning electron microscopy and the distribution of the alloying elements was measured by energy-dispersive spectrometry. The residues of metal jet emitted during MPW was also investigated and analyzed. The interface between the two components is typically wavy and displays an elevated microhardness. The interfacial zone displays discontinuities like inclusions, cracks and pores. No heat-affected zone was observed adjacent to the interface in alloys.

KEY WORDS: Magnetic Pulse Welding, Al couple, Al-Mg couple, jet, wavy interface

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