

Effect of GMAW Pulse Parameters on Weld Bead Shape

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Abstract

Experiments were performed to find the relationship between GMAW-P pulse parameters and weld bead shape measurements, such as dilution, average toe angle, and leg lengths. Primary experiments focused on the effects of primary pulse parameters such as peak current, background current, and peak time. Other “secondary” pulse parameters such as tailout speed, tailout time, stepoff amps, and rise=fall rates were also studied in a secondary experiment.

Statistical analysis was performed on the results of the primary experiment. The correlation (R^2) values for many of the weld measurements were found vary over a wide range. The two most statistically relevant weld measurements (base metal dilution percentage and average toe angle) were chosen for in-depth analysis. Analysis was also performed on the results of the secondary experiment to indicate the degree of effect each secondary pulse parameter had on weld bead shape.

Combined effects of the primary pulse parameters were found to influence bead shape more than individual parameter effects. In addition, the tailout time and speed pulse parameters had stronger effects on bead shape than rise=fall rates.