

OPTIMIZATION & PREDICTION OF WELDING PARAMETERS AND BEAD GEOMETRY IN SUBMERGED ARC WELDING

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ABSTRACT

In submerged arc welding (SAW), weld quality is greatly affected by the weld parameters such as welding current, welding speed; arc voltage and electrode stickout since they are closely related to the geometry of weld bead, a relationship which is thought to be complicated because of the non-linear characteristics. However, trial-and-error methods to determine optimal conditions incur considerable time and cost. In order to overcome these problems, non-traditional methods have been suggested. Bead-on-plate welds were carried out on mild steel plates using semi automatic SAW machine. Data were collected as per Taguchi's Design of Experiments and analysis of variance(ANOVA) was carried to establish input-output relationships of the process. By this relationship, an attempt was made to minimize weld bead width, a good indicator of bead geometry, using optimization procedures based on the ANN models to determine optimal weld parameters. The optimized values obtained from these techniques were compared with experimental results and presented.

KEYWORDS: Weld Bead, ANOVA, Artificial Neural Networks, Sensitivity Analysis