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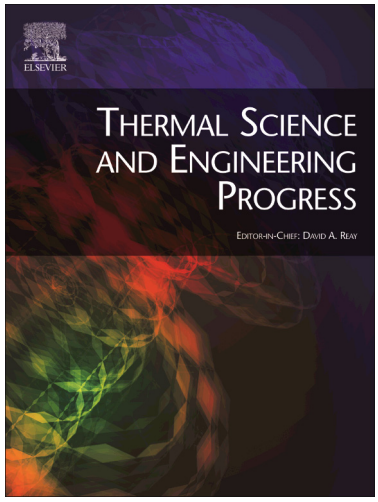

Optimization of Tensile Strength in TIG Welding Using Taguchi Method and Analysis of Variance (ANOVA)

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Optimization of Tensile Strength in TIG Welding Using Taguchi Method and Analysis of Variance (ANOVA)

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Abstract: The main criteria discussed on this paper about the welding optimization parameters and tensile strength of duplex stainless steel 2205 by tungsten inert gas welding based on Taguchi method and analysis of variance. Taguchi method of orthogonal L9 design experiment is carried out using orthogonal array for defining the problem occur on welding process and to reduce the error occurred in the neural network for the prediction of output. The neural network is a mathematical prediction model for the optimization process using back propagation algorithm. Analysis of Variance (ANOVA) is a decision tool for detecting the variation of process parameters, it is a statistical technique for find out the optimal level of factors for the verification of the optimal design parameters through confirmation experiments. The purpose of this paper to increase the tensile strength, hardness and depth of weld by varying the parameters such as current, time, speed, variation of oxide fluxes, electrode diameter and gas flow rate. The Mat lab software is used for analyzing results and it shows that neural network coupled with taguchi method and Anova is an effective method for optimizing the weld quality of material.

Keywords: TIG Welding, Taguchi Method, Analysis of Variance (ANOVA), Orthogonal Array, Design Optimization.

1. INTRODUCTION

Metal joining plays a significant role in modern fabrication technology. Production of materials increased by day to day and competition of manufacturer is also increasing. Recent technologies in production such as metal joining, metal welding, strengthening, material quality and durability. Welding is the process of joining two metals by fusing the base metal and by adding a filler material over the surface of molten metal to form a strong bonding on metals. In tungsten arc welding the tungsten electrode with constant weld power supply is used to generate electric arc between the electrode and the workpiece which create resultant heat to form the weld [1]. Welding is an efficient and economic method for permanent joining of metals. Different number of welding process are followed in manufacturing which are implemented in short time. Welding process are differ from one another by usage and type of equipment used. The tungsten inert gas arc welding is one of the most popular welding process followed for the material production. In tungsten inert gas arc welding an electric power supply will create arc which melts base metal to form a molten pool [2]. The filler material is manually added for TIG welding and the molten metal is allowed to cool.

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