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Optimization of Plasma Arc Welding Parameters by Using the Taguchi Method with the Grey Relational Analysis

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Abstract

The optimal parameters process of plasma arc welding (PAW) by the Taguchi method with Grey relational analysis is studied. The Grey relational grade is used to find optimal PAW parameters with multiple response performance characteristics. The welding parameters (welding current, welding speed, plasma gas flow rate, and torch stand-off) are optimized with consideration of the multiple response performance characteristics (the penetration of root, the weld groove width, and the weld pool undercut). As a result, the improvement percentage of the Grey relational grade with the multiple performance characteristics is 31.8%. It is shown that the multiple response performance characteristics are greatly improved through this study.

 Keywords: [Analysis of variance \(ANOVA\)](#) [Dyeing machinery](#) [Grey relational analysis](#) [Keyhole](#)
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