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## An Experimental Investigation on Depth of Penetration Using AR-10% H<sub>2</sub> as a Shielding Gas in GTAW Welding of SA 240 TP 304H

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### Abstract

The fabrication industries are facing problems in weld penetration using only argon as a shielding gas for square-butt weld joint design. The paper investigates the effect on depth of penetration with a use of 10% hydrogen as balanced shielding gas with argon. Welding current, welding speed and gas flow rate are selected as welding parameters to summarize the effect of hydrogen on the depth of penetration. The study was carried out on square-butt welding on autogenous Tungsten Inert Gas (TIG) with nonconsumable electrode without filler wire. Major interest has been shown in arc power, arc efficiency and the statistic characteristics of a welding arc. The resulting input process parameters were optimized with the use of response surface optimization technique.

**Keywords:** Gas Tungsten Arc Welding (GTAW), Analysis of Variance (ANOVA), Response Surface Methodology (RSM), Optimization

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