

STUDIES ON CORROSION RESISTANCE – A REVIEW

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Abstract

Corrosion is degradation of material properties due to interactions with their environments, such as water and chemicals in the surroundings and corrosion of most metals (and many materials for that matter) is inevitable. The corrosion results in deterioration of materials and thereby reducing its durability and strength. Corrosion resistance of materials can be increased by depositing the stainless steel on the mild steel using GMAW. Considerable increase in resistance of corrosion medium can reduce the injuries and fatalities occurring in petrochemical industries. This review presents the reported works on improvising corrosion resistance by cladding process.

Keywords: cladding, austenitic stainless steel, corrosion, GMAW

INTRODUCTION

Now a day's Corrosion plays a vital role in industries. Corrosion is degradation of materials' properties due to interactions with their environments, such as water and chemicals in the surroundings and corrosion of most metals (and many materials for that matter) is inevitable. The corrosion resistance of the mild steel can be increased by depositing a relatively thick layer of stainless steel. Stainless steel is a type of alloy steel which possesses high corrosion resistance and strength than the mild steel. The stainless steel is found to be expensive because of its alloy content. On the other hand mild

steel is having several advantages like low cost and easy to fabricate make it an ideal candidate for the industry. In order to increase the corrosion resistance of the mild steel the surface is deposited with corrosion resistant material usually stainless steel. The stainless steel is deposited by various processes in which gas metal arc welding is found to be more suitable because of its automation capabilities. The deposited stainless steel layer on the mild steel increases corrosion resistance as well as life of the component.

Material Cladding

[1] **Amandeep S. Shahi and Sunil Pandeyis** discuss in increasing productivity of any welding process while maintaining or even improving the weld quality has been the task of researchers in the field of development of welding processes. Previous predictive studies on gas metal arc welding (GMAW) process have had various purposes. Researchers have attempted to model GMAW process in different metal transfer modes and tried to optimize it using different techniques apart from accounting for wire melting rate in this process. "Effect of Auxiliary Preheating of the Filler Wire on Quality of Gas Metal Arc Stainless Steel Claddings" 30— Volume 17(1) February 2008.

[2] **P. SrinivasaRao & O. P. Gupta & S. S. N. Murty & A. B. KoteswaraRao.** Both of them are discuss about the

Taguchi methods are applied to plan the experiments. Five process parameters, viz., wire feed rate, plate thickness, pulse frequency, pulse current magnitude, and travel speed, are selected to develop the models using multiple regression analysis. The models developed were checked for their adequacy. Results of confirmation experiments show that the models can predict the bead geometry with reasonable accuracy. "Effect of process parameters and mathematical model for the reduction of bead geometry in pulsed GMA welding". Int J Adv Manuf Techno (2009) 45:496–505.

[3]**Kamal Pal & Sandip Bhattacharya & Surjya K. Pal** these authors briefly explained about, The variation of weld deposition efficiency with various pulse parameters in pulsed metal inert gas welding was investigated. The arc sound signal along with current and voltage signals were acquired and analyzed in time domain as well as in frequency domain. The sound signal kurtosis and arc power were found to be highly correlated with welding process stability. The weld deposition efficiency was also related to weld surface peak temperature. Finally, an attempt was made to correlate the sound time domain as well as frequency domain features of sound signal with the deposition efficiency. The variation of pulse shape with the duty factor also influenced the deposition efficiency as evidenced by in fast Fourier transform analysis. "Prediction of metal deposition from arc sound and weld temperature signatures in pulsed MIG welding". Int J Adv Manufacturing Techno (2009) 45:1113–1130.

[4] **J. P. Ganjigatti & D. K. Pratihar & A. Roy Choudhury**. These author is made an attempt to determine input-output relationships of the MIG welding process by using regression analysis based on the data collected as per full-factorial design of experiments. The effects of the welding parameters and their interaction terms on different responses have been analyzed using statistical methods. Both linear as well as nonlinear regression analyses are employed to establish the

input-output relations. The results of these regression techniques are compared and some concluding remarks are made. "Modeling of the MIG welding process using statistical approaches" Int J Adv Manuf Technol (2008) 35:1166–1190.

[5] **Seifedine Kadry** the author is discuss about the temperature of smoke, released from these types of burners is lower than 200 0C. When the products of combustion cool down on the top of a chimney, water steam condenses [1, 2]. The condensate is made of various compounds, including sulfur as well. The saturated condensate erodes the chimney and the soot that sticks in the place, where the condensate forms, blocks the chimney. The saturated place of the chimney becomes more translucent and the fume is cooled more intensively; thus, the process speeds up and lower parts of the chimney saturate with the condensate as well. These types of troubles could be avoided by fitting in a steel insert that weighs several kilograms. The insert heats up very fast and the due point is passed over the period of 10-20 minutes as the air-gap between the chimney and the insert contains quite a high resistance. However, the majority of stainless steel is acid nonresistant; and the products of corrosion can include poisonous compounds of chromium and nickel. In this article, we analyze the corrosion of chimney parts made of stainless steel under the conditions of acid environment. Several types of stainless steel were examined.

[6]**A.K. Lakshminarayanan, V. Balasubramanian, R. Varahamoorthy, and S. Babu**. These authors are concentrate in the most important differences lie in the welding efficiency and the weld plate dilution rates While hard facing may influence the microstructure of base (substrate) materials, it can provide better wear resistance depending on the coating materials. Typically, a higher wear resistance can be found in harder materials, with the drawback of lower fracture toughness. "Predicting the Dilution of Plasma Transferred Arc Hardfacing of Stelliteon Carbon Steel Using Response Surface Methodology". METALS AND MATERIALS International,

Vol14, No. 6 (2008), pp. 779~789.

Discussions and Conclusion

- Corrosion is degradation of material properties due to interactions with the outdoor environment, such as water and chemicals in the surroundings add to corrosion of most metals.
- Stainless steel is a type of alloy steel which possesses high corrosion resistance and strength than the mild steel. The stainless steel is found to be expensive because of its alloy content. On the other hand mild

steel is having several advantages like low cost and easy to fabricate make it an ideal candidate for the industry.

- Therefore there is scope of improvising the corrosion resistance by adding a coat of super duplex stainless steel over mild steel and it also reduces the injury rate and fatality rate in petrochemical industries.

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