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Submerged arc welding for jioning dual phase steels

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Abstract

This work describes the results of an investigation on a weld joint comprising dual phase steel. Welds produced by submerged metal arc-welding were examined for their microstructural features and properties. The welds were found to have the austenite and ferrite constituents and an attempt was made to study about the fusion boundary produced during welding and the microstructure was compared with the weld joint for joining LAS.

Key words: *Corrosion resistance, Dual phase steels, Dissimilar metal welds, Hardness, Microstructure*

1. Introduction

Joining of materials by fusion welding processes is inevitable for engineering applications, although under many circumstances these joints are vulnerable to environmental degradation. It then becomes mandatory to design welds to meet the service requirements with appropriate control over the process conditions, by taking care of chemistry and resultant microstructure. Joining of dual phase steel to plain carbon steels by gas tungsten arc welding and their microstructural features have been addressed by Barnhouse *et al.* (1998), but there is not much published information available on this combination of weldments (Berchmans *et al.*, 1996; Celik and Alsaran, 1999). Although the corrosion behavior of weldments of similar materials has been investigated by a few researchers (Hemmingsen *et al.*, 2002; Majid *et al.*, 1990; McPherson *et al.*, 2003), the information on the properties of the dissimilar weldments, especially those comprising DSS, is very scarce. The current work describes the microstructural features and electrochemical behavior of dissimilar weld joints between a boiler-grade low alloy steel (LAS) and duplex stainless steel (DSS), produced by submerged arc welding using stainless steel electrodes.

2. Experimental procedure

The materials used in the current investigation are high martensite dual phase steel. Welds were produced by Submerged arc welding accordingly. Plates of suitable dimension, were used for producing the joints and a 70° single "V" edge preparation was followed with a root face and root gap of 2 mm each. The welds were produced in four passes (including the one laid after back-gouging the root) using the following parameters: 110-120 A; 22-24

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