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Microstructure and Mechanical Properties of a Dissimilar GTA Weld between 2205 duplex stainless steel and API X-70 high strength low alloy steel (HSLA)

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Abstract : The duplex stainless steels and HSLA steels are attractive for applications in the oil and gas industry due to their properties. The dissimilar welds are widely used in the petroleum industry for economical reason. However, the welding of dissimilar metals considered difficult, due to the differences in the physical properties of the two metals. The aim of the present study is to investigate the influence of the welding process parameters on the microstructure and mechanical properties of dissimilar weldment of 2205 duplex stainless steel /API X-70 high strength low alloy steel (HSLA) produced by GTA welding. The microstructures of the welded joints were investigated by the optical microscopy (OM), the mechanical properties included hardness, impact and tensile strength was investigated, the fracture surfaces of the tensile specimen were examined by scanning electron microscopy (SEM). From this investigation, it is observed that, the microstructural characteristics and mechanical proprieties of the weld are influenced by the heat input.

Keywords : GTA welding, Dissimilar welding, heat input, duplex stainless steel, HSLA steel, microstructure, mechanical properties, Fractography