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**Cladding of low-carbon steel to austenitic stainless steel by hot-roll bonding:
Microstructure and mechanical properties properties before and after welding**

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Abstract

The aim of this contribution was to study the performance of clad low-carbon steel (ASTM A283 Grade C) to austenitic stainless steel (ASTM A240 type 316/AISI 316) using hot-roll bonding. The mechanical and metallurgical properties of the clad steel have been investigated before and after welding. Three weld samples with different configurations are prepared from clad materials and, then, these joined metals were studied.

Results on the microstructure, microhardness and mechanical strength were reported. Experimental studies showed that austenitic stainless steel AISI 316 (clad layer) could be clad to low-carbon steel A283 (parent metal) with a good quality of bonding by hot-roll bonding. The bond interface of the clad metals indicated that there is an intermediate zone between the clad layer and parent metal with heterogeneous microstructures due to the carbon diffusion. It was also found that microhardness measured from the clad layer to the parent metal showed an abrupt change adjacent to the interface due to a coarse grained soft ferritic band near the interface with larger microhardness than the adjacent metals. Tensile results revealed that the bonding was acceptable in all weld samples. It was also observed in bending tests that interfaces of bonded samples were safely carried out for some welding configurations. Toughness strength of the clad metals at a given test temperature was found significantly higher than that of parent plate alone because of the high impact toughness of austenitic stainless steel layer. Consequently, mechanical properties of the low-carbon steel can be improved by hot-roll bonding with austenitic stainless steel.

Key words: Cladding; Bonding; Steel; Welding; Interface; Microhardness.

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