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STUDY OF HARDNESS PROPERTIES OF BUTTWELDED JOINTS USING SHIELD METAL ARCWELDING (SMAW) ON STAINLESS STEEL PLATE

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ABSTRACT

This proposal concentrated on the hardness characteristics of shield metal arc welding (SMAW) butt welded joints on stainless steel plate. One of the most widely used welding methods today is SMAW, although this kind of SMAW welding is robust and difficult. Are the samples that were welded utilising SMAW defective in any way regarding porosity? In order to determine whether this method of SMAW welding is appropriate for welding stainless steel and whether there are any porosity problems once the welding is complete, this research article will continue the investigation. SMAW type welding with butt joint type will be used in this study to weld the stainless steel plate. The hardness value of the welded sample will be calculated using a Vickers hardness machine. The porosity of the sample that has been welded will be tested for faults using a dye penetration test in this investigation.

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CHAPTER 1

Introduction

1.1 Research background

The SMAW (shielded metal arc welding) technique is one of the most widely used material joining procedures in a variety of industries, including marine, shipbuilding, automotive, aerospace, construction, and petrochemicals. Due to the increasing demand on the manufacturing sector, the welding process must be environmentally friendly. A variety of input and output streams are used in the SMAW process. The many input and output streams involved with the SMAW process, including as electrical energy requirements, input material consumptions, slag formation, fumes emission, and hazardous working conditions associated with human health and occupational safety, are linked to sustainability concerns. To improve the SMAW welding process's environmental performance, it's necessary to define the process's long-term viability within a broader framework of sustainability. Majority of the existing literature concentrates on the technical and economic elements of welding, but environmental and social concerns are rarely addressed. The study looks at the SMAW process in terms of the triple bottom line (economic, environmental, and social) approach to sustainability. Finally, the research concluded with recommendations for creating a cost-effective and long-term SMAW welding method.

Next, butt welding is a typical welding technique that can be done by hand or by machine on steel parts. For copper parts, butt welding can also be done with brazing. It is used to join two metal items together, such as pipes, factory structures, and flanges. A flange is an internal or external component that helps to strengthen a piece of material. Butt welding has demonstrated how cost-effective it can be for businesses when constructing metal structures. This is because they would have to bend everything and reinforce the structure if they wanted to construct something out of metal without welding it, which would cost more than welding the two pieces together. Butt welding is done by heating or applying pressure to two pieces of metal,

or by doing both. When welding, it is critical to maintain metal penetration, which is possible with thin pieces of metal. However, with thick pieces, edge preparation may be required to prepare the metal. When full penetration butt welds are made within the larger or stronger metal, they are called full penetration butt welds. The strongest welds in butt welding will have the fewest flaws. The heat input is adjusted to achieve this, resulting in a smaller weld. When this is done in commercial welding, the cost is reduced as well, but the weld strength is maintained by using twin butt welds. There are two forms of butt welding used to generate certain welds, and there are also a number of junctions that are designated butt joints.Because of its natural ability to connect two pieces of metal, butt welding is best conducted using MIG or TIG welding procedures. The quality of the weld, such as corrosion resistance and strength, will be determined by the type of welding electrodes used by the welder. In order to unite the two pieces, electrodes conduct current through the metal being welded. The sort of welding required is determined by the metal. Heavy or light coatings are applied to the electrodes. Because they are significantly stronger and corrosion resistant, highly coated electrodes are often used in structural welding. The electrodes with a light coating are not as structurally sound. If the weld is resting flat, butt welding is done with the Arc, TIG, or MIG welder held at a slight angle to the weld to achieve the least amount of porosity and maximise the weld's strength. Despite being weaker than butt welds, fillet welding accounts for around 80% of the connection. Fillet welds allow more room for mistakes with much larger tolerances, which is why they are use more frequently. Despite the resemblance, fillet welding is not a sort of butt weld.

After that,butt welded joints come in a variety of shapes and are all given names based on their shape. The connection, also known as a square groove weld, comes in a variety of shapes and sizes to connect metal parts and is capable of supporting loads. Lap joints, tee joints, butt joints, and corner joints are just a few examples of different types of joints. Lap

joints are made up of two sections that are welded together end-to-end, whereas butt