

Study of cast iron and its welding electrodes

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Abstract— Cast iron is a group of carbon iron alloys with carbon percentage greater than 2%. As we seen that ductile cast iron have spheroidal graphite flakes, nodules which stops crack from further processing. Welding is the process of joining two metals by means of fusion. An electrode is mainly used to bearing the current through a workpiece to accomplish two pieces together depending upon the processes. Electrode either consumable in case of MIG welding, SMA welding etc. or non consumable in case of TIG welding. The nickel based electrode is widely used to weld cast iron due to its high mechanical strength corrosion resistance, etc. **Keywords:** cast iron, welding, nickel based electrode, strength.

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I. INTRODUCTION

The cast iron is acquired by melting of pig iron with coke and limestone in a cupola furnace. It is a melting device used in foundries and more commonly the size of cupola furnace in foundries is to be 1.5 to 15 feet (0.5 to 4.5). the shape of the cupola is cylindrical and it consist of doors at the bottom made up of steel and refractory bricks lining. Since cast iron is brittle material it cannot be used in those parts of machines which are restrain to shocks. It has some good properties like low cost, wear resistance, and excellent machinability.

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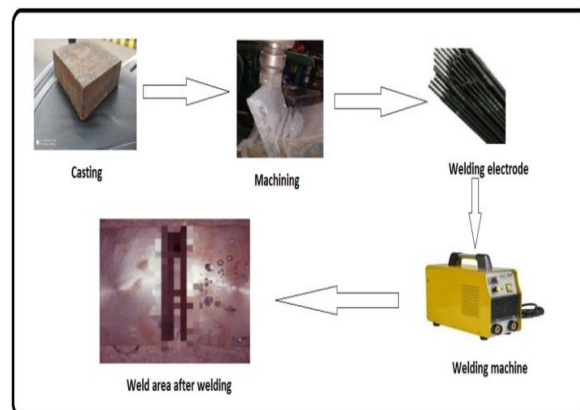
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II. Objectives

- Study and analyze the welding process under the mechanical properties and microstructure on the same material.
- To perform welding and understand the importance of welding
- To know safety measures for using the welding machine along the welding process.
- It helps to know the comparison of welding according to the welding speed, electrode cost, current and voltage , effectiveness.
- To set up the criteria of applications based on the welding process.

III. Framework

Fig. shows the framework i.e. the arrangement of the welding procedure performed. It consist of raw material plates, V grooving plates, electrode, welding machine and welding sections. Now as shown in the figure, firstly casting of the cast iron material in the dimensions of 150*150*30mm. After that facing is done on the workpiece. Then making of 30 degree single V groove on either side of the plates. Use of more suitable electrode for this type of grade of the cast iron and lastly application of welding is done with the help of welding machine. So, in this way it shows the proposed framework of study and experimentation of cat iron material with the use of proper electrode and welding.



IV. Study methodology

A. Casting:

It is the most common manufacturing process used in mechanical engineering as well as in foundry. Casting, in which molten metal is poured in molds which is having cavity space of desired shape and size. It is found that the mould is made up of sand generally very fine silica sand. Sand casting is preferably used because of its good characteristics such as they are refractory in nature and do not chemically formed with molten metal which is having high degree of permeability and porosity.



Fig. Casting:

B. Machining:

Machining is the process in which the raw material is cut into a required shape and size for the final operation. By material removal process. V grooving is done on the milling machine hence we have to make a 30 degree angle for the single V groove on the either side of the material. It is seen that the V groove is obtained by placing the plates edge to edge as shown in fig. The total angle of 60 degree is done for the welding of two raw material plates.



Fig. Machining

C. Electrode :

An electrode is an electrical conductor used to make contact with non metallic part a circuit. It can be metal or solid substances (mixtures). Moreover nickel based electrodes are used in the purpose of welding for cast iron plates because it having corrosion resistant, hardness, properties etc. It is found that monel electrode is an important alloy of nickel and copper exhibit specific gravity of 8.80 and higher melting range. It contains 68%nickel, 29% copper and 3% residual constituents like iron, magnese, silicon, carbon. It is generally used for making propeller pump fitting, steam turbine, repairing of weldings.



Fig. Electrode

D. Welding:

The welding joint is a permanent joining process in which fusion of the edges of two parts to be joint by the input of heat or pressure. The required heat may be generated by burning of gas or by an electric arc. It is also used in repairing medium. The welding provides very rigid joints and the process of welding requires less time than riveting. The submerged metal arc welding is more preferred because welding electrodes with solid material. It is observed that the projection of coating electrodes focuses on the flow of arc which protects the entrance of air and prevents large amount of oxygen and nitrogen.



Fig. Welding

V. Conclusion:

Welding, from past decades and centuries it is in used either by very small joints to in huge construction sides. Welding has influenced completely to the human life. Cast iron is a brittle material but it possesses valuable properties such as cheap in cost, ease of availability, low melting temperature, compressive strength, etc. It shows that cast iron is an alloy of iron and carbon . In gray cast iron the graphite parent in its normal form and it acts as a lubricant. The grey cast iron widely used for machine tool bodies, automotive cylinder blocks, heads, flywheel, pipes and agricultural equipments. It is found that the graphite flakes in cast iron acts as a discontinuities in matrix and thus lower its mechanical properties along with sharp edges of the flakes act as a stress inducers. To avoid this effects changing graphite flake form to a spheroidal form.

VI. References:

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