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Literature Review Paper onTypes of Welding

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Abstract:*A weld is made when separate pieces of material to be joined combine and form one piece when heated to a temperature high enough to cause softening or melting. Filler material is typically added to strengthen the joint. Welding is a dependable, efficient and economic method for permanently joining similar metals. In other words, you can weld steel to steel or aluminum to aluminum, but you cannot weld steel to aluminum using traditional welding processes. Welding is used extensively in all sectors or manufacturing, from earth moving equipment to the aerospace industry.*

Keyword:*Weld, Heated, Filler, Manufacturing, Welding industries*

I. INTRODUCTION

Arc welding is a type of welding that uses a welding power supply to create an electric arc between an electrode and the base material to melt the metals at the welding point. They can use either direct (DC) or alternating(AC) current, and consumable or non-consumable electrodes. The welding region is usually protected by some type of shielding gas, vapor, or slag. Arc welding processes may be manual, semi-automatic, or fully automated. First developed in the late part of the 19th century, arc welding became commercially important in shipbuilding during the Second World War. Today it remains an important process for the fabrication of steel structures and vehicles.[1]

To supply the electrical energy necessary for arc welding processes, a number of different power supplies can be used. The most common classification is constant current power supplies and constant voltage power supplies. In arc welding, the voltage is directly related to the length of the arc, and the current is related to the amount of heat input. Constant current power supplies are most often used for manual welding processes such as gas tungsten arc welding and shielded metal arc welding, because they maintain a relatively constant current even as the voltage varies. This is important because in manual welding, it can be difficult to hold the electrode perfectly steady, and as a result, the arc length and thus voltage tend to fluctuate. [1]

II. SHIELDED METAL ARC WELDING (SMAW)

SMAW is a welding process that uses a flux covered metal electrode to carry an electrical current. The current forms an arc that jumps a gap from the end of the electrode to the work. The electric arc creates enough heat to melt both the electrode and the base material(s). Molten metal from the electrode travels across the arc to the molten pool of base metal where they mix together. As the arc moves away, the mixture of molten metals solidifies and becomes one piece. The molten pool of metal is surrounded and protected by a fume cloud and a covering of slag produced as the coating of the electrode burns or vaporizes. Due to the appearance of the electrodes, SMAW is commonly known as 'stick' welding.[2]

SMAW is one of the oldest and most popular methods of joining metal. Moderate quality welds can be made at low speed with good uniformity. SMAW is used primarily because of its low cost, flexibility, portability and versatility. Both the equipment and electrodes are low in cost and very simple. SMAW is very flexible in terms of the material thicknesses that can be welded (materials from 1/16" thick to several inches thick can be welded with the same machine and different settings). It is a very portable process because all that's required is a portable power supply (i.e. generator). Finally, it's quite versatile because it can weld many different types of metals, including cast iron, steel, nickel & aluminum.[2]

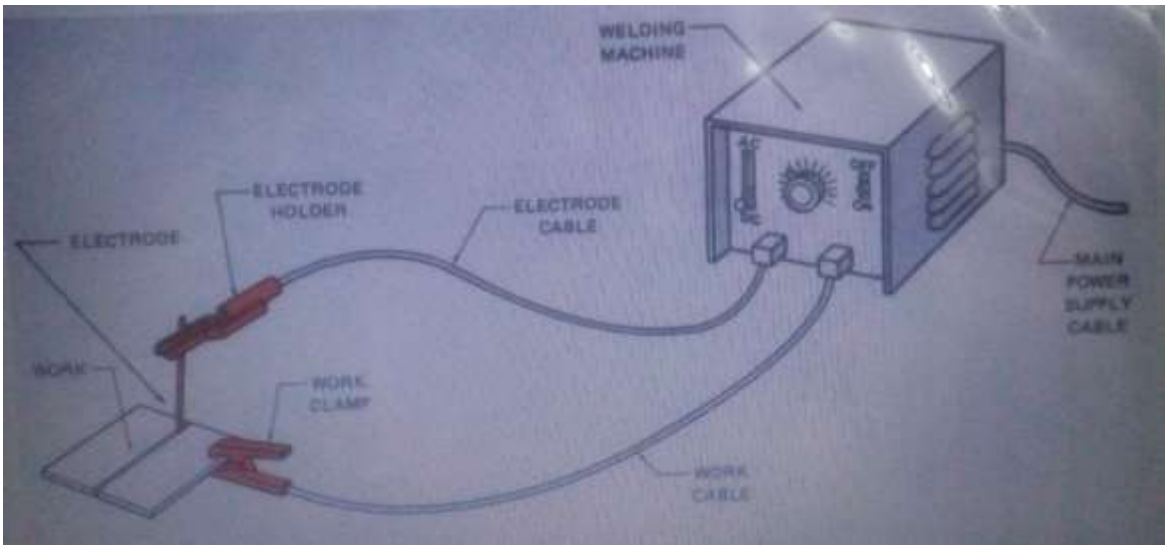

Figure 1: Shielded metal arc welding (SMAW)

III. ADVANTGES OF SMAW

a) This welding machine is cheap.
b) It has is no gas required.
c) It is portable.
d) It is used in any type of metal can weld.

IV. DISADVANTAGES OF SMAW

a) It has required skill person.
b) Major cleaning problem is faced.
c) Relatively dirty method of welding.

V. GAS METAL ARC WELDING (GMAW)

In the GMAW process, an arc is established between a continuous wire electrode (which is always being consumed) and the base metal. Under the correct conditions, the wire is fed at a constant rate to the arc, matching the rate at which the arc melts it. The filler metal is the thin wire that's fed automatically into the pool where it melts. Since molten metal is sensitive to oxygen in the air, good shielding with oxygen-free gases is required. This shielding gas provides a stable, inert environment to protect the weld pool as it solidifies. Consequently, GMAW is commonly known as MIG (metal inert gas) welding. Since fluxes are not used (like SMAW), the welds produced are sound, free of contaminants, and as corrosion-resistant as the parent metal. The filler material is usually the same composition (or alloy) as the base metal.[3]

GMAW is extremely fast and economical. This process is easily used for welding on thin-gauge metal as well as on heavy plate. It is most commonly performed on steel (and its alloys), aluminum and magnesium, but can be used with other metals as well. It also requires a lower level of operator skill than the other two methods of electric arc welding discussed in these notes. The high welding rate and reduced post-weld cleanup are making GMAW the fastest growing welding process.[3]

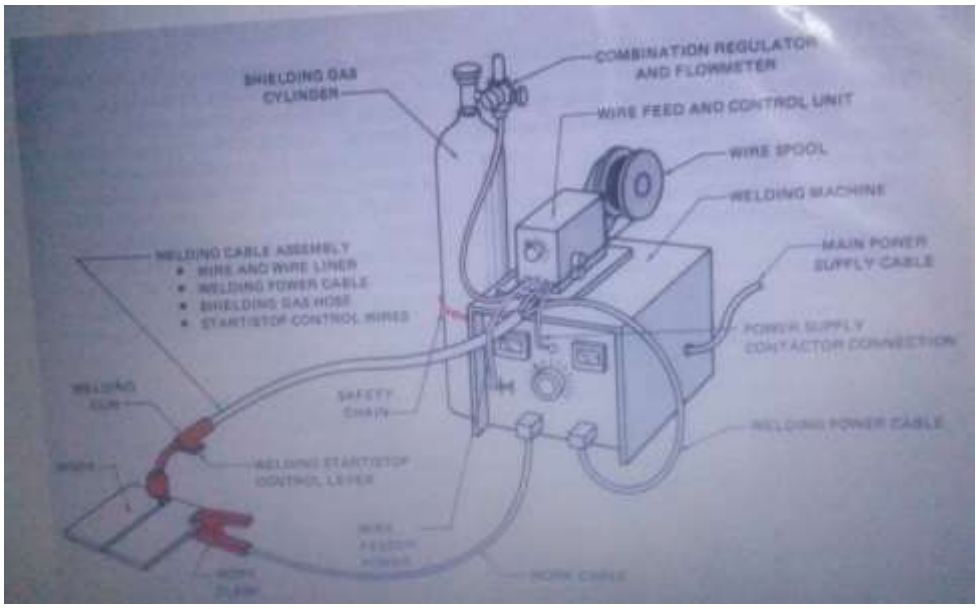

Figure 2: Gas mate arc welding (GMAW)

VI. ADVANTEGES

a) Faster than other welding.
b) It is better than other.
c) It can weld any type of metal and thickness.

VII. DISADVANTAGES

a) It is required shielded gas.
b) It has minority cleaning required.

VIII. GAS TUNGSTEN ARC WELDING (GTAW)

In the GTAW process, an arc is established between a tungsten electrode and the base metal(s). Under the correct conditions, the electrode does not melt, although the work does at the point where the arc contacts and produces a weld pool. The filler metal is thin wire that's fed manually into the pool where it melts. Since tungsten is sensitive to oxygen in the air, good shielding with oxygen-free gas is required. The same inert gas provides a stable, inert environment to protect the weld pool as it solidifies. Consequently, GTAW is commonly known as TIG (tungsten inert gas) welding. Because fluxes are not used (like SMAW), the welds produced are sound, free of contaminants and slags, and as corrosion-resistant as the parent metal.[4]

Tungsten's extremely high melting temperature and good electrical conductivity make it the best choice for a non-consumable electrode. The arc temperature is typically around 11,000° F. Typical shielding gasses are Ar, He, N, or a mixture of the two. As with GMAW, the filler material usually is the same composition as the base metal. [4]

GTAW is easily performed on a variety of materials, from steel and its alloys to aluminum, magnesium, copper, brass, nickel, titanium, etc. Virtually any metal that is conductive lends itself to being welded using GTAW. Its clean, high-quality welds often require little or no post-weld finishing. This method produces the finest, strongest welds out of all the welding processes. However, it's also one of the slower methods of arc welding.[4]

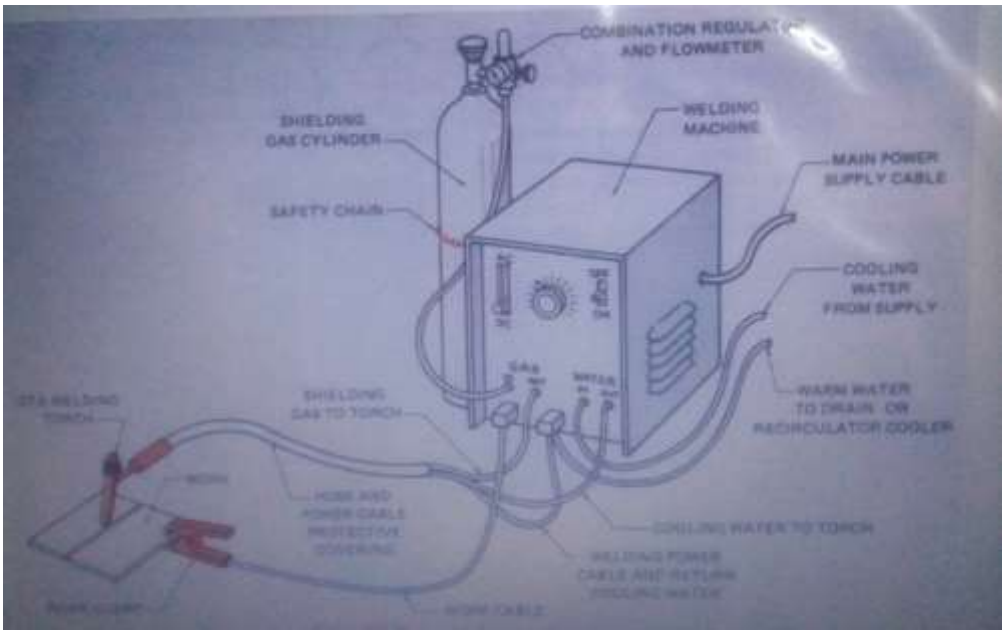

Figure 3: Gas tungsten arc welding (GTAW)

IX. ADVANTEGES

a) It has high quality welding.
b) Not required high cleaning.
c) It can weld any type of welding metal and thickness

X. .DISADVANTAGES

a) It has shielded gas required.
b) Slowest in all welding process.
c) Required high skill person.

XI. SELECTION OF WELDING

The selection of the joining process for a particular job depends upon many factors. There is no one specific rule governing the type of welding process to be selected for a certain job. A few of the factors that must be considered when choosing a welding process are:

- Availability of equipment
- Repetitiveness of the operation
- Quality requirements (base metal penetration, consistency, etc.)
- Location of work • Materials to be joined
- Appearance of the finished product
- Size of the parts to be joined
- Time available for work
- Skill experience of workers
- Cost of materials
- Code or specification requirements

XII. CONCLUSION

That the conclude is the arc welding is very useful to the industrial area but in arc welding the safety is more needed in this, but the gas and gas tungsten is more use in commercial area, it is required more shielded gas to weld any type of metal parts the worker is wear the helmet and then the process is done then the start the arc welding.

XIII. REFERENCE

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