PORTABLE SPOT-WELDING MACHINE

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ABSTRACT

Our project is designed in such a way that spot welding machine should be light in weight and convenient to carry anywhere. This project represents the portability of resistance spot welding machine and study of various factors like the thermo-effect of nugget growing in single phase AC resistance spot welding and heating of electrodes during spot resistance welding. The designed welding machine is very less in weight with same strength of the regular spot-welding machine with more degree of freedom to work with. The first thing is the fabrication of the portable spot-welding machine which is divided into two phases, first the formation of basic circuit of machine which includes small transformer of 0.1 kVA with output voltage 0.8 to 1 Volt with 2-gauge wire and second is the formation of body and arm mechanism of the machine. Also, the study is on various the factors which come into light when process of spot welding takes place. One such factor is nugget formation. The nugget formed in the work piece plays a crucial role in joining structure. Nugget forming process is not visible and hard to test.

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1. INTRODUCTION: -

In earlier studies, researchers have found the possibility of nugget growth mechanism analysis and weld quality calculation by various methods. Destructive test method was the commonly used method for spot weld quality, which was widely used in macrostructure or microstructure observation and mechanical characteristic testing.

Because of its low efficiency and results in the invalidation of product, the non-destructive test is necessary in manufacture. Engineers toward quality evaluation of spot welds have developed various non-destructive test methods such as ultrasonic testing and ultrasonic C-scan detection. All these are off-line test methods and still problematic in test efficiency.

2. BLOCK DIAGRAM: -

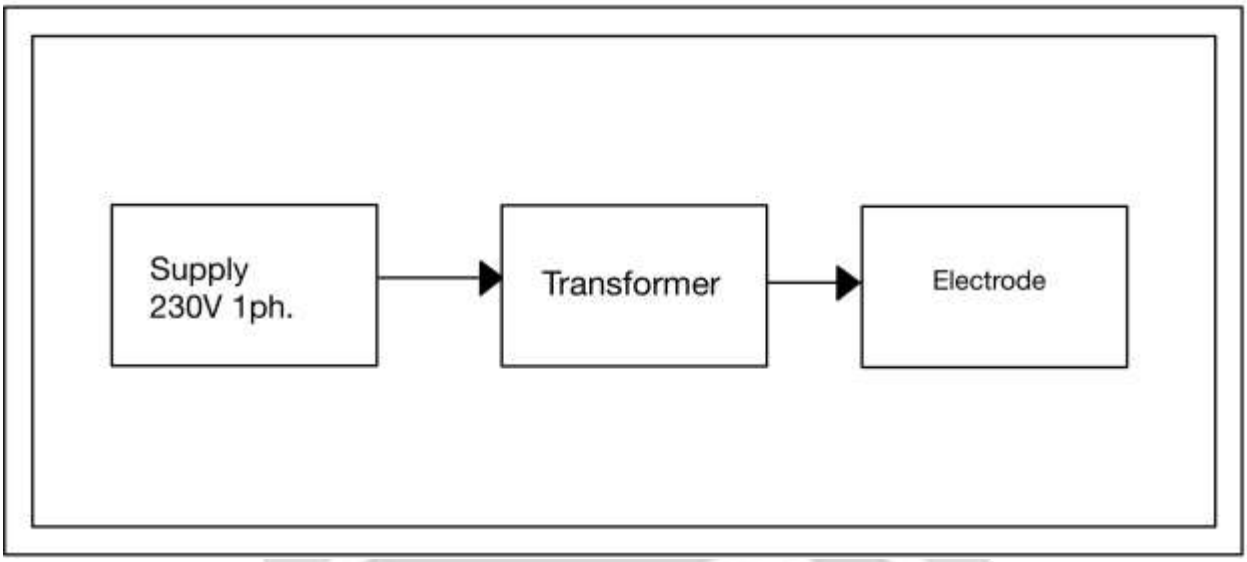


Fig -1: Block Diagram

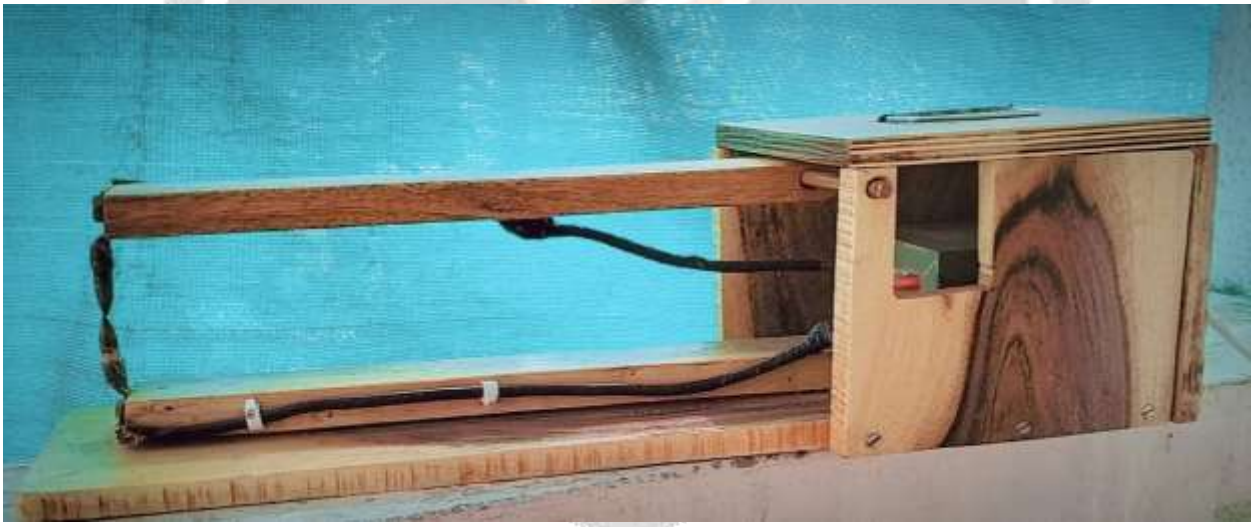


Fig- 2 Working Model

3.WORKING: -

A sharp current is passed through two copper electrodes holding the workpiece in a lap orientation generates an electric arc across the contact surfaces. This results in the generation of intense heat there by melting the work piece material. When released, the arcing stops and the melted material quickly re-solidifies, forming a

nugget. A current-force programme in which both parameters change with time, is used to produce welds of high quality.

An initial force is applied to ensure a good contact between sheet and electrode, thereby reducing the contact resistance. The force is then lowered. i.e., the contact resistance between the sheets increases, and the current is allowed to flow. The rate of current increase (up slope), amplitude, time and current decrease rate (downslope) can be regulated to suit the alloy to be welded. Heating of the metals during current flow causes these to soften, so that the force decreases. Shortly after the maximum current is reached, the force is increased to press the sheets against each other (forging effect). Similar programmes are mandatory for welding in the aerospace industry Guidelines are available for the spot welding of a large number of aluminium alloys. The parameters stated in the guidelines depend, among others, on the surface condition and roughness, type of current, material thickness as well as form of electrodes and material. The current used for aluminium are much higher than those required for spot welding steel, making it necessary to utilize machines with a higher power rating for spotwelding aluminium. The type of material used for the electrodes has a significant influence on the operational life. Experience has proved that material strength and hardness are of greater importance than the electrical conductivity.

4. COMPONENTS USED: -

(1) Transformer:

A step-down transformer of 1.2 KVA with output voltage of 0 to 1 volt with 2 gauge wire.

(2) Electrodes:

Two copper electrodes are used in this for spot welding of the piece

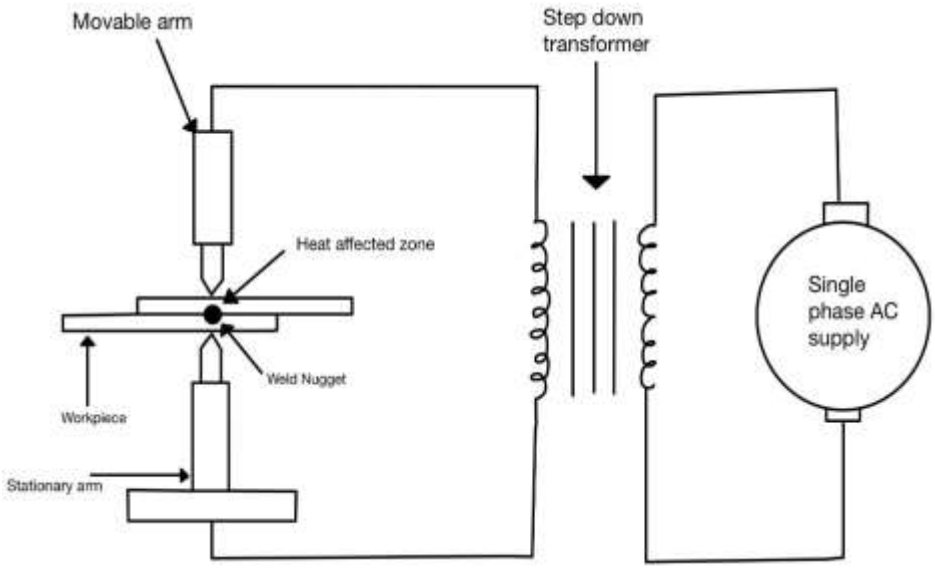
(3) Supply Cable:

Supply cable rating is 2-3 gauge.

6. LIST OF COMPONENTS:-

Sr. No.	Part	Quantity
1.	Transformer	1
2.	Copper electrode	2
3.	Supply Cable	1

7. CIRCUIT DIAGRAM:-



8. ADVANTAGES:-

- Machine is light in weight can be carried anywhere.
- Low power consumption.
- Can be carried anywhere.
- More finished work of welded piece.

9. DISADVANTAGES: -

- Metals can be welded up to 1-2 mm not more than that.

10. FUTURE SCOPE: -

There is need to optimize the structure of the machine. We can use higher rating transformer, with the help of higher rating transformer we can weld thick metals.

11. REFERENCES

[1]. Fernando Bugallo, "Welding Technology," U.S. Patent No. 4563003 1983.
[2]. Neiger et al. "Smart Welding Process." U.S. Patent No. 4678184, 1987.
[3]. Jong-Ho Song and Ick Choy, "Smart Weld Technology," IEEE Trans. on Power Electronics, vol.19, no.2, pp. 312-319, March 2004. P. Pillay and R. Krishnan, "Modeling, simulation, and analysis of permanent-magnet motor drives," IEEE Transactions on Industry Applications, Vol. 25, pp. 265-273, March/April 1989.