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# PORTABLE COMBINE SEAM AND SPOT WELDIING MACHINE

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***Abstract*** — manufacturing engineering in general has experienced an increased demand of process planning in order to optimize process to reduce costs, environmental impact and increase time efficiency. Resistance welding is a common and large-scale joining method in several manufacturing industries indicating significant potentials of efficient process planning. Generally resistance welding machine requires a lot of space heavy, restrained by height in this project we have then to overcome the above problems recreating the design. We trying to create a simple, lighter, portable, compact, and flexible and economically machine which will be able to weld any type of weld like spot, tack, overlap, continuous welding. Generally this different type of welding required two different welding machines which require more space and experience worker for operate the machine. We studied various research paper and concluded that two different machine are expensive and so more requirement so decided that to make combine single welding machine to fulfilled the all the requirements. The goal of this project is to establish new knowledge for updated and improved process planning of resistance welding in industrial applications. The goal is expressed by required two different welding machines for different joining welding application can be done by portable combine seam and spot welding machine. For developing this machine we used solid works software for designing, modeling and finite element analysis to make working model based on the design.

***Keywords- Resistance Welding, Transformer, Combine Seam and Spot, Solid works,***

## I. INTRODUCTION

Welding is a process for joining two similar or dissimilar metals by fusion. It joins different metals/alloys, with or without the application of pressure and with or without the use of filler metal. Welding provides a permanent joint but it normally affects the metallurgy of the components.[6] It is therefore usually accompanied by post weld heat treatment for most of the critical components In resistance spot welding, two or more sheets of metal are held between electrodes through which welding current is supplied for a definite time and also force is exerted on work pieces In this process overlapping sheets are joined by local fusion at one or more spots, by the concentration of current flowing between two electrodes. It is a continuous type of spot welding wherein spot welds overlap each other to the desired extent. In this process coalescence at the faying surfaces is produced by the heat obtained from the resistance to electric current (flow) through the work pieces held together under pressure by circular electrodes. The seam welding is similar to spot welding, except that circular rolling electrodes are used to produce a continuous air-tight seam of overlapping welds. Overlapping continuous spot welds seams are produced by the rotating electrodes and a regularly interrupted current [7].

## II. OBJECTIVES

- flexible
- less costly
- Compact in size
- Provide ease of operation to welder and
- It's portable
- Does not require a rigid foundation
- Simple design
- Very less area occupied
- Whole welding application perform
- Economic and light weight
- Easy handling and less skilled worker

## III. MAIN PURPOSE

In generally now a days welding process is huge requirement in fabrication industry but in small scale industry having no enough space and economically for them to purchase spot and seam welding machine. Because spot welding machine and seam welding machine are available in market separately and more expensive, require more space and experience worker. Therefore we design simple and compact to make portable combine seam and spot welding machine Using this machine we perform all type welding application like spot welding, tack welding, overlapping welding, continuous welding etc. not required more space, easily operate, single machine is required instead of two deferent machine.

## IV. PRINCIPLE OF RESISTANCE WELDING PROCESS

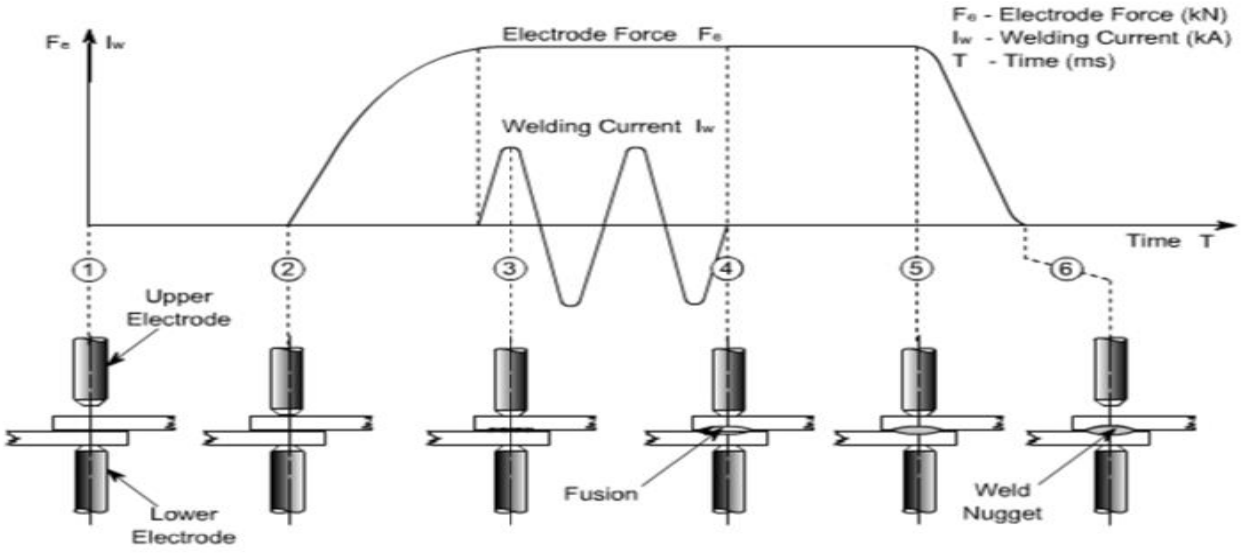


Fig.1-Resistance Welding Cycle

- **Squeeze Time** During the squeeze time, the welding electrodes are moved together and the force is applied from the pressure chamber. The pressure will force the work pieces together to build up the necessary resistance for the welding process. If there is less squeeze time, the welding current will start flowing before the work pieces are tightly joined together. This will cause overheating, spatter, electrode wear and, eventually, a defective weld.[7]
- **Heat or weld Time** The weld time is the time during which a set amount of current flows through the work pieces. If this time is large, expulsion will take place, which means that the molten metal is expelled from the welding nugget as a shower of sparks. On the other hand, if this time is less cold weld is obtained, or sometimes no welding nugget is formed.[7]
- **Hold time** This is the time after the application of the current, pressure is applied so that the Work pieces are held tightly together to form a welding nugget.[7]
- **Off time** during this time the pressure is released and the electrodes are separated for the Next spot weld.[7]
- **Welding time** Resistance welding depends on the resistance of the base metal and the amount of current flowing to produce the heat necessary to make the spot weld. Another important factor is time. In most cases, several thousand amperes are used in making the spot weld. Such amperage values, flowing through a relatively high resistance, will create a lot of heat in a short time with the addition of the time element;[7] the formula is completed as follows:

$$H = I^2 \times R \times T \times K$$

H = Heat
$I^2$ = Welding Current Squared
R = Resistance
T = Time
K = Heat losses

## V. COMPONENTS OF MACHINE

1. **Transformers**
   In this project, we use single phase transformers. A single-phase two-winding transformer is nothing more than a primary and a secondary winding wound around the same magnetic core. Single-phase two-winding transformers can be used in either single-phase circuits or polyphase circuits. A polyphase two-winding transformer contains a number of sets of primary and secondary windings. Each set wound around a separate magnetic core leg.
2. **Spot electrode**
   There are two types of electrode material such as brass and copper. Copper is a higher heat resistance and high conductivity material. So in this project we use copper material. We use two copper electrodes for spot welding which has 16mm diameter and 150 mm equal Hight.

Fig.2-Spot Electrode

**3. Seam Roller**

We use seam wheel for seam welding. We use copper wheel which has two different dimension upper wheel has a 130-mm diameter and lower wheel has 76-mm diameter both wheel has same thickness around 7mm.

Fig.3-Seam Roller

**4. Time controller**

Time controller required in welding machine for set of welding time. During welding process power is required very few second about 0.54s to 1s. If the timer is not use the power supply become high so burn the plate during welding process.

**5. Motor**

In this project we use 230v AC motor for the rotating of seam roller with 2-3 rpm.

## VI. POWER SUPPLY CIRCUIT DIAGRAM

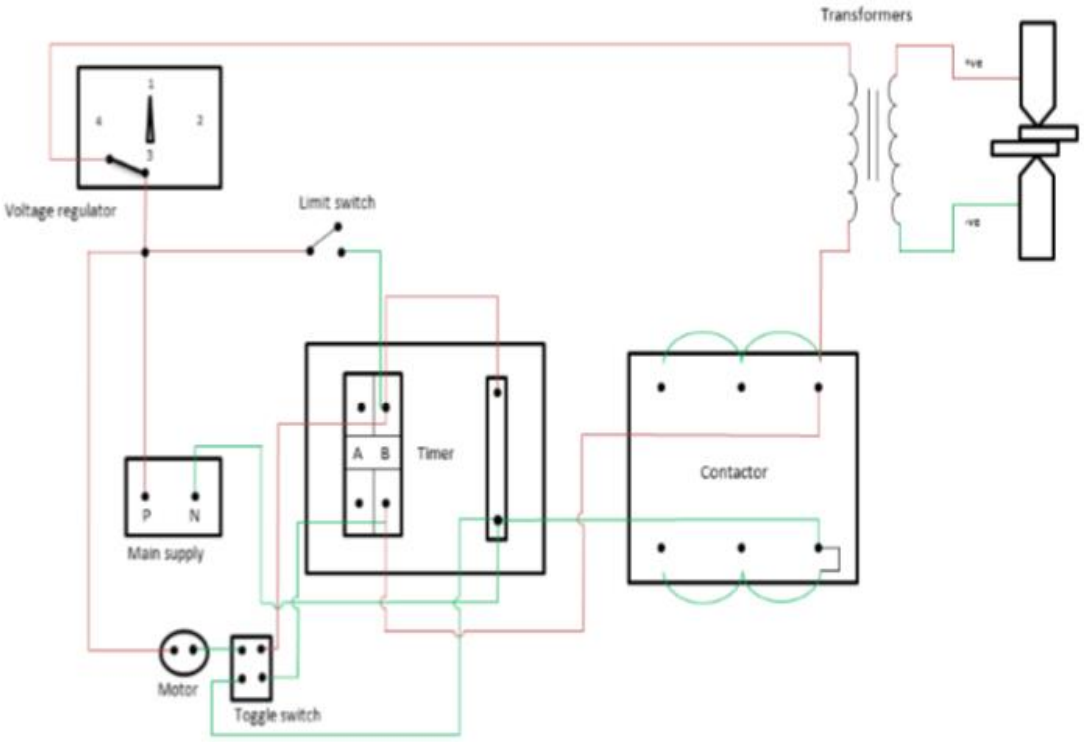


**Fig.4-Circuit Diagram**

## VII. COMPARISON

| General equipment | Our equipment |
|---|---|
| Complex design | Simple Design |
| Foundation required | Foundation not required |
| Difficult handling | Easy handling |
| Experienced worker | Less skilled worker |
| Stationary equipment | Portable equipment |
| Occupies more floor area | Very less area occupied |
| Different machine require as per application | All application to be perform |
| Costly | Economic |
| Heavy weight(more than 200kg) | Light in weight(50 kg) |

Table1- Comparison

Fig.5(a)-Spot Welding Machine

Fig.5(b)-Seam Welding Machine

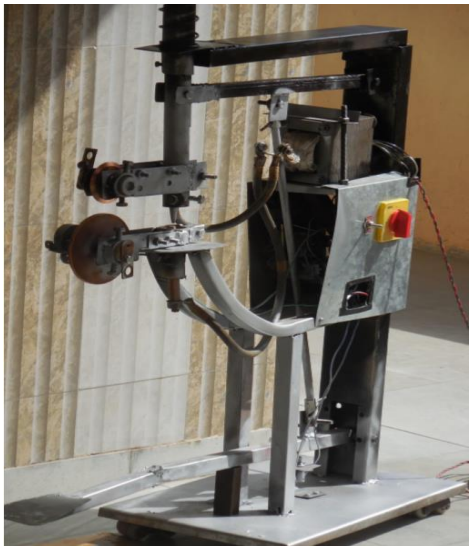

Fig.6-Portable Combine Spot & Seam Welding Machine

## VIII. APPLICATION

- It has applications in automobile and aircraft industries
- The attachment of braces, brackets, pads or clips to formed sheet-metal parts such as cases, covers or trays is another application of spot welding.
- Many assemblies of two or more sheet metal stampings that do not require gas tight or liquid tight joints can be more economically joined by spot welding than by mechanical methods.
- Containers and boxes frequently are spot welded.
- It is used for making leak proof joints in fuel tanks of automobiles.

## IX. CONCLUSION

This project provides a low cost portable spot and seam welding machine in comparison to present resistance spot and seam welding machine which is costly, occupies larger floor area, of complex design, can only be used by an experienced worker. The present equipment is rigid; foot operated and weighs nearly above 200 kilos. In this project we have removed the above said problems by creating a much simpler, lighter, portable, compact, flexible and combine seam and spot both can be done in one machine which is able to weld and can be easily operable by a less experienced worker with much ease and required accuracy. We conclude that our machine can be mass produced and can also be m u l t i p u r p o s e used for industrial process.

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