IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE)
e-ISSN: 2278-1684,p-ISSN: 2320-334X
PP. 21-24
www.iosrjournals.org

"Special Purpose Machine for Linear Welding"

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Abstract: *In today's edge of technology the demand of precision is increasing. The tradition methods are replaced by the automation to increase accuracy and precision increase the quality of welding, incorporation of the semi- automated welding machine is done for. certain application. For that different parameters and methods have tobe considered from different research paper for the welding machine for selection of mechanism like controller, welding process, weld angle etc. toget accuracy and quality weld. The technical constraint that has tobe considered while designing and developing the machine is to achieve the stability, degree of freedom, linear and angular motion, and uniform speed of the welding torch for feed and uniform thickness of weld for quality product.*

The paper deals with the designing of mechanism, which can weld the circular as well as line component with accuracy, a linear motion with an improved degree of fineness and are relatively less cumbersome than traditional welding process. The technical constraint that has to be considered while designing and develop in the mechanical is was to achieve the stability, linear and uniform speed of welding torch and uniform weld thickness for quality product. The details of testing on various silencer shell give in paper.In near futur variable frequency drive (VFD) can be installed for its full atomization.

Keywords: *SPM, Automatic welding, Design of Machine, Robotic Welding ,Machine Vision*

I. Introduction

Welding is defined as the process of joining similar metals by the application of heat. During welding, the edges of the metal pieces are either melted or brought to plastic condition. This process is used for making permanent joints, which is obtained by homogenous mixture of two materials. Now a days welding finds wide spread applications in almost all branches of engineering industry. It is extensively employed in the fabrication and erection of steel structure in industries and construction. It is also used in various industries like aircraft frame works, railway wagons, furniture, automobile bodies, ship buildings, nuclear industries etc. depending on the application. Arc welding is usually performed by a skilled human worker who is oftenassisted by a person called fitter. The working conditions of the welder are typically extent. Because these factors can be varied over a large range, theyare considered the primary adjustments in any welding operation. Their values should be recorded for the observation.

II. Literature Review

Fu-senRen Xiao-zehad developed a new type of special welding robot, which mixed design method of series and parallel and realized the integrated design of organization for robot and anchor. The robot kinematics is build and realiz ed the real time control of welding torch position, orientation and welding speed during welding process. A.M.Vaid y a and P. M. Padole had calculated the flexibility of the links and joint stiffness. Zhao Yang has described effect of plasma torch scanning frequency on temp. Distribution at molten pool surface. In simulation plasma torch power is 750 kW, melting rate is 300kg/hr the torch scanning frequency changes from 0.0833 Hz to 0.5 Hz. ION Lucaciu had worked on welding head enables vertical positioning of welding wire relative to electrode position, adjusting the lead angle when entering into metal bath or turning device for bringing the welding wire in front of or behind the torch according to direction of welding. R. Xiao has worked on function of pressing wheels device is to provide the clamping force to sheet plates through a pressing wheels rolling on surface of sheet plates which is generated by compressed spring. The position sensors are used to indicate the position compressed spring. On other hand, they are necessary for connection and support for the components of clamping devices. The region of compactforce of spring device is designed from 50 N to 500N which can basically meet requirement in actual welding

III. Methodology

To achieve the above objectives D-optimal methodology has been selected. The D-optimal method is relatively a new technique, related to response surface methodology, used for carrying out the design of experiments, the analysis of variance, and the empirical modeling. The D-optimal criterion was developed to select design points in a way that minimizes the variance associated with the estimates of specified mode coefficients. In a sense this method is more useful than central composite design (a conventional response surface method) method that it demands smaller number of experiments to be conducted and also it can tackle categorical factors included in the design of experiments. Basic steps for achieving the desire objectives are:

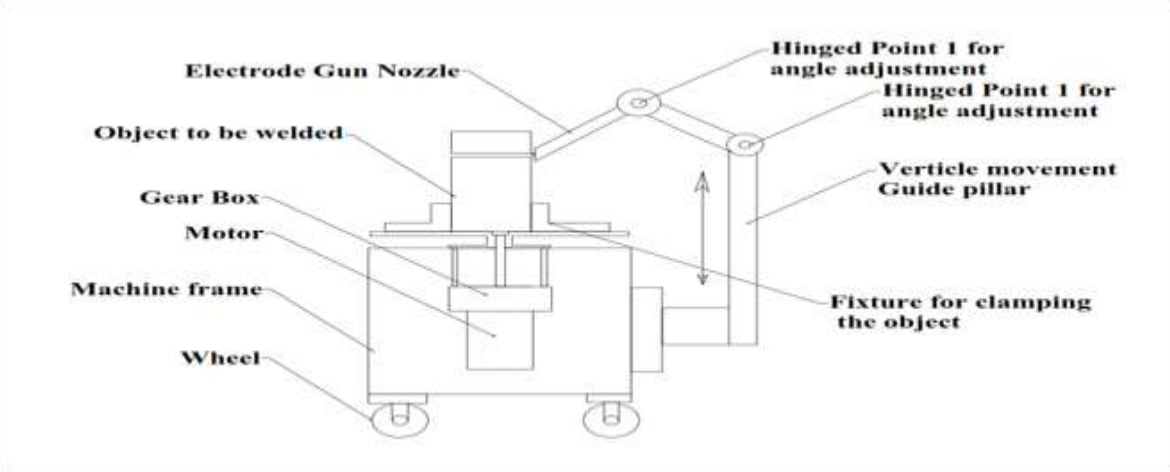
Data Collection: According to design matrix based on D-optimal design matrix, The experiments will be conducted on mild steel plate using 304 stainless steel electrodes.

- Empirical Modeling: Development of empirical model (relationship between GMAW responses and the GMAW parameters) using regression analysis.
- Test for adequacy of develop model: Checking of model significance, model terms significance using ANOVA analysis. This empirical model will helpful in optimal selection of GMAW parameters.
- Optimization of GMAW Parameters: Analysis and selection of optimal GMAW parameters for a low dilution rate.

unpleasant.The arc from the welding process emits ultraviolet radiation which is injurious to human vision.Other aspects of the process are also hazardous. For instance, the high temperatures created in welding and the resulting molten metal is inherently dangerous. The electrical current that is usedto create the welding arc is also unsafe. During the welding process, sparks and smoke are generated and these make the environment unsafe to the operator. As a result of these difficulties,robots are being employed on the production line to perform arc welding operations. The robot is programmed to perform a sequence of welding operation on the product as it arrives at the workstation . However, there are significant technical and economic problems encountered in applying robots to arc welding. One of the most difficult technical problems for welding robots is the presence of variations in the components that are to be welded . One is the variation in the dimensions of the parts in a batch production job. This type of dimensional variation means thatthe arc welding path to be followed will slightly change from part to part. The second variation isin the position of orientation of work piece itself. These two problems can be overcome if we optfor a machine vision system. The machine vision system consists of a camera and a controller.

As we know welding process is the part of production process which is very much responsible for the production rate and in turn in its cost of production.So in our project were tried to automate the welding process in a cost effective process. Our project aims at developing a much cheaper but effective and advanced SPM for linear welding with automated kit for automating the whole welding process. SPM for linear welding is one of the most widely used processes in industry.The input parameters play a very significant role in determining the quality of a welded joint. In fact, weld geometry directly affects the complexity of weld schedules and thereby theconstruction and manufacturing costs of steel structures and mechanical devices. Therefore, these parameters affecting the welding should be estimated and their changing conditions during process must be known before in order to obtain optimum results; in fact a perfect weld can be achieved when all the parameters are in conformity. These are combined in two groups as first order adjustable and second order adjustable parameters defined before welding process. Former are welding current, voltage and welding speed. These parameters will affect the weld characteristics to a great

IV. Working



The above diagram shows the complete experimental setup of our proposed system.

The job to be welded is placed on the indexer table and considering the welding process and electrode size the speed regulator is adjusted to give desired table speed. The table carries indexer buttons as per no of welds and position of the same. Table is indexed to the first stop position. Now inching switch is operated simultaneously as the welding process is started, the job rotates as welding operation is done, after the second indexer button comes in front of the proximity switch it stops the welding process and the table movement. Inching switch is operated which starts the next position welding and the process is repeated till the last stop i.e., the first stop comes in front of the proximity switch. The job welded is unloaded and new work-piece is loaded for the next operation.

V. Advantages

1. Uniform High Welding Quality
2. Taking Less Time
3. Labour safty
4. High Accurecy and Precision

VI. Disadvantages

1. In welding process is that the requirement for heat in producing many welds can disrupt the base material microstructure and degrade properties. Unbalanced heat input can also lead to distortion or the introduction of residual stresses that can be problematic from several standpoints.
2. Manufacturig cost is High
3. Maintaince Cost is High

VII. Conclusion

The manual welding process has lot many limitations and disadvantages like less productivity, inconsistence quality of welding and dimensional inaccuracy, and dependency on operators to large extent. All these disadvantages are overcome by automatic linear welding SPM. Industries are acquainted by automation and linear welding SPM will find many applications in several industries in coming decades.

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