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Design and Manufacturing of Double End Drive (DED) Machine for Automation of Welding Process for Flexible Bellow in Exhaust System

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ABSTRACT: Welding is a manufacture or sculptural procedure that joins materials, normally metals or thermoplastics, by causing combination. This is frequently done by softening the work-pieces and adding a filler material to shape a pool of liquid material (the weld pool) that cools to turn into a solid joint, with pressure some of the time utilized related to warm, or without anyone else, to create the weld.

In industry, there are distinctive geometrical shapes to which an administrator needs to weld. Every single shape conveys its own operational limitations. Round welding is one of the most basic welding process did physically, particularly when precision and consistency is of high concern. A manual method of round welding conveys such huge numbers of impediments like lower exactness and accuracy, high wire, gas and power wastage and successive miniaturized scale splits. This offers ascend to need of mechanization for roundabout welding. The massiveness and multifaceted nature of round welding because of the nearness of various holding game plans and installations makes it costly and exceptionally tedious procedure. Then again, because of the multifaceted nature of the procedure, accessibility of gifted specialist is troublesome. In addition, because of repetitive and high fixation work plan, specialist weakness turns out to be high and consequently it powers the inclination of laborer to have high wages. To keep away from these unwanted conditions, the application requests import

of computerization for this round welding process. Welding computerization overall uses distinctive pneumatic and hydro pneumatic instrumentation.

This work plans to configuration twofold end drive (DED) machine for mechanization of round welding process in exhaust framework. Fumes framework comprise get together of curve pipe, adaptable roar and straight channel (catcon). These twist funnel and straight channel are weld with adaptable roar in center. It has two roundabout situation on both face of channel. These two face are situated at two distinct areas in flat plane. To weld the funnel and roar onto their individual position, we need to plan a SPM which must convey a mechanize drive for uniform and exact round welding. This work moreover delineates job of computerization, Automation is a lot of accommodating in cost sparing and to build the efficiency of the framework.

INTRODUCTION

Welding

- The craft of joining metals is around 3000 years of age. The beginning of welding is likely to be followed to the molding of metals. In industry each laborer is working for changing the state of metals by various strategies and machines. “Welding is the way toward consolidating two bits of metal so holding happens at their unique limit surfaces”. Exactly when two segments to be merged are mollified, warmth or weight or both are associated and with or without included metal for advancement of the metallic bond. With the routinely growing enthusiasm for both high age rates and high precision, totally mechanized or robotized welding structures have accepted a prominent situation in the welding field. The rate at which computerization is being brought into the welding technique is bewildering and it may be ordinary that before this present century's over more robotized machines than men in welding produce units will be found. Likewise, PCs expect a fundamental activity in running the motorized welding structures and the headings are given by the PC will be taken from the ventures, which hence, require counts of the welding factors as logical conditions. To make effective usage of the automated structures it is basic that an elevated level of assurance is practiced in envisioning the weld boundaries to accomplish the desired mechanical quality in welded joints. To make logical models to unequivocally envision the weld solidarity to be

supported to the automated welding systems has ended up being progressively principal.

- Notwithstanding liquefying the base metal, a filler material is normally added to the joint to frame a pool of liquid material (the weld pool) that cools to shape a joint that, in light of weld
- Arrangement (butt, full infiltration, filet, and so on.), can be more grounded than the base material (parent metal). Weight may likewise be utilized related to warm, or without anyone else, to create a weld. Welding likewise requires a type of shield to ensure the filler metals or liquefied metals from being tainted or oxidized.
- Albeit less normal, there are additionally strong state welding procedures, for example, rubbing welding in which the base metal doesn't soften.
- The absolute most popular welding techniques include:
- • Oxy-fuel welding – otherwise called oxy-acetylene welding or oxy welding, utilizes fuel gases and oxygen to weld and cut metals.
- • Shielded metal curve welding (SMAW) – otherwise called "stick welding" or "electric welding", utilizes a bend of electric flow between the material and a cathode stick, which is held in the turn in a terminal holder, to weld metals together. Motion on the anode and slag on the weld shields the weld puddle from environmental tainting.
- • Gas tungsten curve welding (GTAW) – otherwise called TIG (tungsten latent gas), utilizes a non-consumable tungsten cathode to create the weld. The weld region is shielded from air sullying by an idle protecting gas, for example, argon or helium.
- • Gas metal circular segment welding (GMAW) – normally named MIG (metal inactive gas), utilizes a wire taking care of firearm that feeds wire at a flexible speed and streams an argon-based protecting gas or a blend of argon and carbon dioxide (CO2) over the weld puddle to shield it from air tainting. MAG welding (metal, dynamic gas) is comparative however utilizes a functioning gas, for example, 75% Argon and 25% Carbon Dioxide which responds with the liquid weld puddle while additionally protecting it.
- • Flux-cored circular segment welding (FCAW) – practically indistinguishable from MIG welding aside from it utilizes a unique rounded wire loaded up with transition; it tends to be utilized with or without protecting gas, contingent upon the filler.
- • Submerged circular segment welding (SAW) – utilizes a consequently taken care of consumable terminal and a cover of granular fusible transition. The liquid weld and the circular segment zone are shielded from air tainting by being "lowered" under the transition coverElectro slag welding (ESW) – a highly productive, single pass welding process for thicker materials between 1 inch (25 mm) and 12 inches (300 mm) in a vertical or close to vertical position.
- Electric resistance welding (ERW) – a welding process that produces coalescence of laying surfaces where heat to form the weld is generated by the electrical resistance of the material. In general, an efficient method, but limited to relatively thin material.

Many different energy sources can be used for welding, including a gas flame (chemical), an electric arc (electrical), a laser, an electron beam, friction, and ultrasound. While often an industrial process, welding may be performed in many different environments, including in open air, under water, and in outer space. Welding is a hazardous undertaking and precautions are required to avoid burns, electric shock, vision damage, inhalation of poisonous gases and fumes, and exposure to intense ultraviolet radiation.

Until the end of the 19th century, the only welding process was produce welding, which metalworkers had utilized for centuries to join iron and steel by warming and pounding. welding and bull fuel were among the principal procedures to grow late in the century, and electric opposition welding followed

before long. Welding innovation progressed rapidly during the mid twentieth century as the universal wars drove the interest for dependable and cheap joining techniques. Following the wars, a few present day welding strategies were created, including manual techniques like SMAW, presently one of the most mainstream welding strategies, just as self-loader and programmed procedures, for example, GMAW, SAW, FCAW and ESW. Improvements proceeded with the innovation of laser pillar welding, electron bar welding, attractive heartbeat welding (MPW), and contact mix welding in the last 50% of the century. Today, the science keeps on progressing. Robot welding is typical in ndustrial settings, and specialists keep on growing new welding strategies and addition more noteworthy comprehension of weld quality.

In industry, there are diverse geometrical shapes to which an administrator needs to weld. Every single shape conveys its own operational limitations. Roundabout welding is one of the most basic welding process did physically, particularly when exactness and consistency is of high concern. A manual method of round welding conveys such huge numbers of burdens like lower exactness and accuracy, high wire, gas and power wastage and regular miniaturized scale splits. This offers ascend to need of mechanization for roundabout welding. The massiveness and multifaceted nature of round welding because of the nearness of various holding game plans and apparatuses makes it costly and exceptionally tedious procedure. Then again, because of the multifaceted nature of the procedure, accessibility of talented specialist is troublesome. Also, because of repetitive and high fixation work plan, laborer weakness turns out to be high and subsequently it constrains the inclination of specialist to have high wages.

To stay away from these unfortunate conditions, the application requests import of mechanization for this round welding process. Welding computerization overall uses diverse pneumatic and hydro pneumatic instrumentation.

Progression in pneumatic just as in hydro pneumatic instrumentation has been a sharp piece of concern. It has gotten one of indispensable viewpoint in the field of innovative work because of its viable yield and scope of exactness. More up to date and more current successful strategies have been completed to improve the robotization and to make it modest. This report shows job of mechanization. In view of our undertaking, Automation is a lot of accommodating in cost sparing and to expand the profitability of the framework.

Fundamental prerequisite for any assembling organization is to have successful work yield. On the planet with regularly developing innovations, framework becomes outdated early. In this way it is extremely important to actualize a legitimate work framework to decrease creation time and to maintain a strategic distance from significant expense of not computerizing. The robotization of assembling offices and assembling emotionally supportive network expands the shop productivity. It lessens the piece and improve, in this way diminishing the material and assembling cost.

There is consistently a need of firm and reasonable example of work yield, for which robotization is a lot of dependable. Robotization can be characterized as the innovation engaged with mechanized dealing with among machines and persistent preparing at the machines. Mechanization is certainly not another innovation and has been used in the business since a long while. In current occasions, mechanization has broadly misused the benefits of the electronic and robot innovation for accomplishing effective and full oversight over creation.

Automation in Welding

Robotized welding can give generous gains in effectiveness and profitability - in the right applications. Welding is apparently the most unusual gathering process and is a lot

of the time the smallest understood. An astonishing number of associations consume countless dollars to robotize gathering while simultaneously neglecting the welding system. Manual welding is so far the best system for certain social occasions. Nevertheless, various building operators are realizing automated welding structures to grow quality, proficiency, and profitability.

Welding computerization can be isolated into two major groupings: self-loader and totally modified. In self-loader welding, an executive genuinely stacks the parts into the welding establishment. A weld controller by then keeps the welding method, the development of the light, and tranquility of the parts to preset boundaries. After the weld is done, the executive ousts the completed party and the method begins again.

In totally modified welding, a custom machine, or plan of machines, stacks the work piece, records the part or light into position, accomplishes the weld, screens the idea of the joint and discharges the finished thing. Extra "part set up" and last thing quality checks may moreover be organized into the machine if basic. Dependent upon the movement, a machine executive may be basic.

Not many out of each odd welding task is a better than average contender for mechanized welding. Applications will benefit most from motorization if the quality or limit of the weld is essential; if dull welds must be made on undefined parts; or if the parts have amassed vital motivating force before welding. Splendid contender for computerization join batteries, capacitor containers, solenoids, sensors, transducers, metal wails, hand-off fenced in territories, light segments, fuel channels, bottle carafes, remedial parts, nuclear devices, pipe fittings, transformer focuses, valve segments and airbag portions. Associations that assemble obliged measures of things requiring exact or fundamental welds may benefit by a self-loader system, yet would apparently not require totally modernized structures.

Benefits of Automated Welding

Mechanized welding frameworks offer four principle preferences: improved weld quality, expanded yield, diminished piece and diminished variable work costs. Weld quality comprises of two components: weld trustworthiness and repeatability. Robotized welding frameworks guarantee weld respectability through electronic weld process controllers. Consolidating automated light and part movements with electronic review of welding boundaries brings about a more excellent weld than can be cultivated physically. This offers immediate quality control. Besides, in light of the fact that a weld is made just a single time, surrenders are promptly obvious and perceptible. People tend to "smooth more than" a slip-up with the light, concealing absence of infiltration or a conceivably imperfect weld. Sometimes, spill testing and vision frameworks can be coordinated into completely computerized frameworks to give extra quality control.

Repeatability is a component of the nature of the weld procedure controller and of the building of the machine movements. Motorized welding gives repeatable info boundaries to increasingly repeatable yield. Accepting the controller is working appropriately, the inquiry becomes: Can the systems of the machine position the parts or the light inside the predetermined resiliences for welding? The response to this inquiry will bear witness to the nature of framework bought.

Self-loader and completely programmed frameworks increment yield by disposing of the human factor from the welding procedure. Creation weld speeds are set at a level of greatest by the machine, not by an administrator. With insignificant arrangement time and higher weld speeds, a motorized welding framework can without much of a stretch outpace a gifted manual welder.

Mechanizing the light or part movements, and part situation, decreases the chance of human blunder. A weld happens just when all necessities are fulfilled. With manual welding, dismiss welds regularly increment when welders become exhausted. Contingent upon the estimation of the parts when they show up at the welding station, the cost investment funds in scrap alone may legitimize the acquisition of a computerized welding framework. Mechanization ought to likewise be viewed as when constructing agents need to limit the danger of transportation a terrible part to a client. Dependence on human welders can significantly expand a producer's work costs. When making arrangements for work costs, makers must consider the time that welders spend delivering gatherings.

Regularly, a self-loader framework has in any event double the yield of a talented welder. A completely programmed framework can be worked

with twin welding positioners on a computerized transport. Such a framework can stack and empty parts at one station while welding happens at the other. Along these lines, a completely programmed framework can run at four Arial the pace of self-loader framework, or eight Arial the pace of a talented welder. Lost open door costs are likewise huge. On the off chance that a gifted welder neglects to answer to work, the organization's variable costs soar. Eight hours of creation time is lost. Accessibility of gifted work for manual welding may likewise represent a test. On the other hand, general machine administrators are more promptly accessible and more moderate than gifted work.

All That Glitters

Regardless of the considerable number of advantages, welding framework robotization is joined by certain disadvantages. Despite the fact that the downsides can be controlled, they ought to be perceived from the beginning of a robotized welding venture.

Computerized welding frameworks require a higher beginning venture than manual frameworks. Adaptability is additionally an issue. The adaptability of a machine has an opposite relationship with the level of computerization. While a manual welder can without much of a stretch move starting with one section then onto the next, particular welding gear and frameworks can just fulfill a committed specialty in the assembling procedure. Adaptability of execution is traded for exact, repeatable and exact welds.

When moving from work serious to capital-escalated forms, organizations must receive and thoroughly follow preventive support programs. Depending on one machine to accomplish crafted by eight welders resembles putting the entirety of one's eggs into one bushel. While the additions in efficiency and gainfulness can be exceptional, a powerful preventive upkeep program must be followed to limit the danger of exorbitant personal time. Contingent upon the multifaceted nature of the framework, a support program ought to incorporate cleaning and greasing up the machine, adjusting the controls and force flexibly, and supplanting consumables.

Executing a mechanized welding framework requires a more drawn out lead time for arriving at full-scale creation. In the event that an organization needs to start welding parts promptly, manual machines might be bought and executed surprisingly fast or hours. Self-loader machines can take 4 to about two months to convey. Completely programmed frameworks ordinarily have lead Arial of at least 20 weeks. The drawn out advantages of computerized welding frameworks frequently exceed the underlying expenses of these lead Arial. Accordingly, conveyance Arial ought to be considered in the arranging procedure.

Prior to putting enormous wholes in mechanization, constructing agents ought to consider item life cycle. Most items follow an anticipated example of presentation, development, development and decay. Constructing agents would be silly to sink money into mechanizing the get together of an eight-track cassette deck. Then again, the interest for airbag components and car emanation sensors will presumably stay solid for a considerable length of time.

Deciding to Automate

With quality and profitability as trendy expressions, and clients requesting predominant items, actualizing a computerized welding framework may decide if an organization stays serious. To dodge entanglements en route, constructing agents need to set up a system and tail it intently.

To start with, constructing agents ought to decide the specific targets of the undertaking. What explicitly should be improved, quickened or changed through computerized welding? The accompanying inquiries can assist constructing agents with sifting through this:

• Does the capacity of the part rely upon an excellent weld? What are the consequences if the end client gets or utilizes a blemished part?

• What level of computerized welding framework will the creation framework legitimize?

• What metals are included? Do they loan themselves to robotization?

• How is the joining procedure at present being

finished? What is unacceptable about it?

DOUBLE END DRIVE (DED) WELDING MACHINE

As the figure demonstrates the double end drive (DED) welding machine. This machine is extraordinarily structured for this segment to deliver large-scale manufacturing.

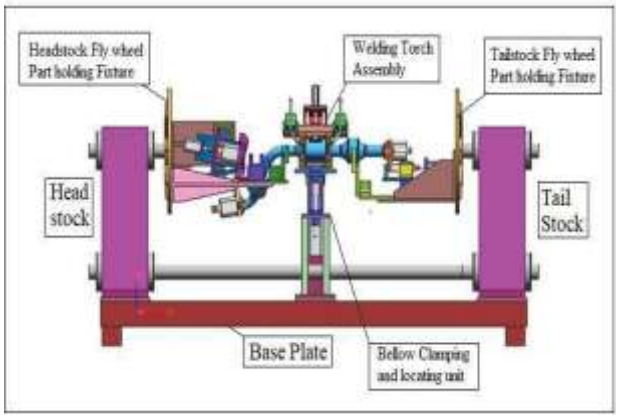

Fig. 2.1 double end drive(DED) welding machine.

DESIGN AND STANDARD PARTS

Double end drive(DED) welding machine. Welding Machine consists of various manufactured and standard parts. Their construction and working, with its function, are as follows.

- Base Plate
- Head Stock
- Tail Stock
- Headstock Fly Wheel Part holding Fixture
- Tailstock Fly Wheel Part holding Fixture
- Bellow Clamping and locating unit
- Welding Torch Assembly

Machine Maintenance and Safety Precautions.

Maintenance

Hardly any maintenance is required for the control panel. However, dusting of control panel is required at regular intervals. Tighten all contacts in the control panel so that there are no Loose connections in the panel. Check the earthing terminal & Ensure –ve contact on the DED all the time. All the power cables in the +ve circuit should be tight & isolated from the–ve circuit at all times.

Daily Check

- Make sure that the Air Pressure for the DED is correct. (i.e. 5 bar indicated on FRL UNIT)
- Make sure that the Gas Pressure for the Co2 Welding M/c. is Correct (i.e. 3 bar indicated on the regulator)

Periodical Inspection (After Every 3 Months)

- Check that the connecting pipes are not loose.
- Check input/output cables for the systems & welding power Supply for poor contact due to loose fit or corrosion. Also check That the insulation is normal & up to the specified limit.
- Check each pressure gauge to make sure that its 0-point is correct.
- Earth Cable: Ensure that the earth cable of the equipment's & Welding power supply is firmly connected to its respective points.
- Cleaning: The systems should be cleaned with dry air.

Safety Precautions.

- Please observe general safety of working environment.
- Use safety equipment's. Always wear eye protection. Dust mask, Non – Skid safety shoes, helmet, or hearing protection must be used for conditions.
- Check at regular intervals that all safety equipment's are effective.
- Report any unsafe working condition to safety officer.
- Damage & defective parts must be repair or replace before using.

- Avoid accidental starting. Be sure switch is "OFF" before plugging in.
- Remove adjusting keys or wrenches before turning the tool "ON". A wrench or a key that is left attached to a rotating part of the tool may result in personal injury.
- Do not overreach keep proper footing & balance at all time.
- Proper footing & balance enables better control of the tool in unexpected situations.
- Read operating instruction manual carefully.

CONCLUSIONS

Automation of circular welding which is successfully achieved in the form of 'Double End Drive [DED] welding Machine' with all desirable features a Double End Drive Welding carries.

- Designs and dimensions obtained in the design cycle came to their supposed results, which leads to error-free welding cycle without susceptible failures.
- As there is no scope for non-uniformity due to automation, the weld thickness is never increases hence saves energy which frequently takes place in manual welding due to human errors.
- Automation allows us to clamp and unclamp the work-piece in shorter time period which saves time. Quality improvement and a decrease in time consumption followed the objectives.
- The manual welding process has many limitations like less productivity, in consistence quality of welding and dimensional inaccuracy. As all processes of the welding are automated with proper drives

FUTURE SCOPE

Machines have been designed to support human beings by helping them to do tedious, dangerous and back breaking works. However, the industry has made only limited use of high technology production concepts. There is general need to nurture the development of successful research and development programs in Automation.

The Double end drive (DED) machine has great future scope for various circular applications not only for metal joining process but also where need any circular operation. The main thing that comes in mind is automation which leads to safe and time beneficiary operating cycle which increase productivity.

This work point towards the future of artificial intelligence and automation With rapid development in artificial intelligence (AI) and automation is at a tipping point. Today, robots can perform a slew of functions without considerable human intervention. Automated technologies are not only executing iterative tasks, but also augmenting work pressure capabilities significantly. Automated machines are expected to replace almost half of the global work pressure. Multiple industries, from manufacturing to banking, are adopting automation to drive productivity, safety, profitability, and quality.

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