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Development and Fabrication of Profile Cutting Machine by Using Cam and Follower Mechanism

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ABSTRACT

The machine we will design and fabricate is used for cutting the end of the tubes so that it fits against another shape for welding. This project gives details about the notching mechanism used for generating profile on the tubes. According to the type of material to cut and thickness of the job, the cutting speed and electric arc generation can be changed. Notching on pipes/ tubes is main process for welding of two circular components perpendicular to each other. In our project "development of mechanism for notch cutting on circular objects", the ac motor is connected to the shaft with the help of pulley the arc cutting torch is connected to the cam and follower mechanism for giving motion as per desired profile. The machine is portable and easy in transportation.

Index terms— Circular Object, Gas Cutting, Transport, Operator

I. INTRODUCTION

Notching is a metal- cutting process used on sheet metal or thin bar stock, sometimes on angle sections or tube. A shearing or punching process is used in a press, so as to cut vertically down and perpendicular to the surface, working from the edge of a work piece. Importance of profile cutting in industry. It is used in profile cutting on pipe for different sizes. Design a cam operated mechanism for producing various shape pipe or tube. The speed of notching is usually limited by manual handling when loading the work pieces into the press. Pieces some feet long may be manually loaded into a single-stroke press. Smaller pieces are still generally hand-fed, limiting speeds to perhaps 100 strokes / minute. It is an operation of removing a small part of metal sheet of desired shape from edge of metal sheet.

II. LITERATURE SURVEY

The whole and sole objective of the project is to develop and design a cam mechanism for the automatic cutting of the tubes to get perfect notches as per the requirement.

Our wide range of tube and pipe cutting machines includes machines that can handle small or large diameter tubes and that can be equipped with power hacksaw. we supply pipe cutting machines for round, elliptic or conical pipes as well as fully automated equipment featuring integrated logistics, or simpler, mobile versions. pipe cutting machines are popular in offshore, pipe processing, ship building, pressure vessel, structural and mechanical contracting manufacturing because of the complex cuts and profiles typical required in their respective industries. pipe cutting, or pipe profiling, is a mechanized industrial process that removes material from pipe or tube to create a desired profile. typical profiles include straight cuts, miters, saddles and midsection holes.

Vishal p. Chaudhary has tested the automatic pipe cutting machine has used for mass production and aim at reducing the human involvement in order to increase the productivity and accuracy of the product. automatic pneumatic pipe cutting machine uses a pneumatic circuit for cutting of pipes which, ultimately reduces the total time required for the Complete Cutting Operation And Increases The Production Rate.

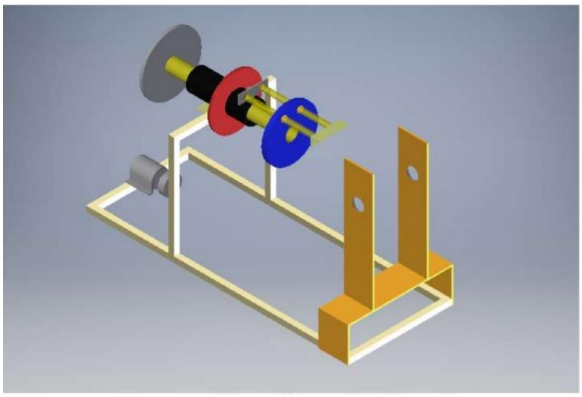

Fig.1.1 cam and follower mechanism

III. COMPONENTS DESCRIPTION THE DIFFERENT MECHANISM USED IN THIS PROJECT ARE AS GIVEN BELOW: -

1) Frame
2) MotorAnd Pulley
3) Cam And Follower
4) Gas Cylinder
5) Shaft
6) Hollow Pipe
7) Aluminum Plates

1. FRAME

The frame is the most important part of the model since all the load has to be placed on the frame including the motor, the bearing and the shaft. The frame dimensions are 900 x 350 x 430 (all the dimensions being in mm). Frame is made up of iron hollow rod. This is done for ease of fabrication, and to decrease the overall weight. The chassis was intended to take a static load of 3kg. The flange which the motor was calculated using aluminum and is bolt to the base.

2. MOTOR AND PULLY

Initially, we tested using a motor from car wipers but after some test we preferred an ac motor from car wipers having the potential of moving both on right & on left. Then we connected the motor with a potentiometer to regulate the speed of its rotation &with a switch that chooses the rotation of the direction as well as the activation of the motor. So as the motor is on the perforated shaft rotates on the direction we want & as the speed we wish. After we have achieved our goal uphill this, we put an aluminum flange lined with linear bearing at the front side of the perforated shaft. The linear bearing is used for ensuring a forward & backward move in our main chain

3) CAM AND FOLLOWER

A cam and follower mechanism is a profiled shape mounted on a shaft that causes a lever or follower to move. Cams are used to convert rotary to linear (reciprocating) motion. As the cam rotates, the follower rises and fall in a process known as reciprocating motion. Its depending upon the diameter of tube of pipe on which profile has to be generated, the cam is designed. In cam the designed angle of notch & depth is been taken into account. If the diameter of the pipe changes a 90 degree, an adjustable arm depends on the changes in diameter. The roller follower traces the path of cam & develops the required profile. The roller is designed in such a way that it adjusts itself on the edges. There is a spring attached in the adjustable arm so that it gets a forward & backward motion. this mechanism basically works on the prolific design, so as we design the profile for cam, the cam will follow that part & cut that desired notch.

4) GAS CCYLINDER

We are using oxyacetylene gas for metal cutting process on pipe and oxy-acetylene can cut only low- to medium-carbon steels and wrought iron. High-carbon steels are difficult to cut because the melting point of the slag is closer to the melting point of the parent metal, so that the slag from the cutting action does not eject as sparks but rather mixes with the clean melt near the cut.

5) SHAFT

A Shaft Is A Rotating Machine Constituent That Is Used To Broadcast Power From One Place To another. The power is brought to the shaft by some lateral force and the resulting torque set up with the shaft permits the authority to be transmitted to a variety of machines linked up to the shaft. To go the authority from one shaft to another, the various members such as pulleys, gears, etc. Are mounted on it. These members along with the armed forces exerted upon them cause the shaft to twisting. In other words, we may say that a shaft is used for the transmission of torque and twisting moment. A variety of member is mounted on the shaft using keys.

6) hollow pipe

In main mechanism on frame hollow shaft are the main part in which component are adjust on it. there shaft a connect motor by pulley and belt drive, shaft adjust on hollow cylinder and these hollow cylinders weld on frame.

IV.METHODOLOGY

The method we followed to complete the project is as follows

1.Collecting research paper: - collecting research paper from the internet on the prefabricated machines for metal cutting process on circular object. Collecting research paper on fabrication of metal cutting mechanism

2.Project proposal: - making a project proposal for the selection of project and experiencing our ideas with project guide and getting suggestion and submitting the project proposal to the project guide.

3. Selecting area of work: - after project finalization we have to decide and area of work for development and fabrication of metal cutting machine. Making cad model and animation of machine: - making and cad model of machine for explain all the concepts related to the machine. Making the animation of machine for explaining the working of machine.

4. Resources: - resources should be fined for fabrication of machines it requires some pre-fabricated parts which are readily available in market also the battery-operated works and fabrication works done from various workshops finding the materials and materials for fabricating parts.

5. Collecting different components; - after fabrication and purchase components should be collected at various location of workplace. Assembly: - assemble all the components of machine as according to cad and animation make sure that is relative motion between parts is efficient and the mechanism used in machine is properly working.

V. WORKING

In our setup as the motor is started, due to rotation of the shaft the flange attached to the holder rotates & it rotates according to cam profile required for the notch. There is also linear bearing which helps in forward & backward movement, using these bearings, we managed to make a basis for the electrode arc cutter. In specific, our system is known as a „pantograph". So thus, the electrode arc cutter is spinning around the tube following the pantograph and removing the material that should be removed. It should be noted that without the pantograph, our machine cuts in a straight line and if it is needed to cut in an angle, the inclination for cutting is chosen according to the direction of clamps rotation. Moreover, using these bearings, we managed to make a basis for the plasma cutter. The method of creating the notch is to use a special grinding tool that uses a sanding belt and grinds the tube to the proper shape. Other style of notching includes Cutting a v – shape out of a square tube so that the two tube sections can fold up to a 45 degree or 90-degree angle, or Special notch and slot combinations can be created for unique applications.

VII. CONCLUSION

This project is working on zero accident base safety model because of cam and follower mechanism uses it work automatically increase accuracy in profile cutting due to automation and due to providing automation in the system reduce time delay of working. It increases the production rate with. Additionally, its potentials are not just restricted to these as it is also capable to cut round flanges and many other things using different clamps and different basis for the plasma cutter. Closing, it is hard to describe this construction in words so there are precise designs.

REFERENCES

1. P.BalashanmugmAnd G. Balasubramanian, Design And Fabrication Of Typical Pipe Cutting Machine, IJRDO-Journal Of Mechanical And Civil Engineering, Issue In 2015 ISSN: 2456-1479.
2. Theoretical Analysis ofMulti-Way Power Hacksaw Machine, 02 Day, 5th International Conference on Recent Trend in Engineering, Science In 2013 And Management,\(ICRTESM.16), ISBN: 978-93-86171-12-2.

3. Nimbalkar ShrimpedPneumatically Operated Automatic Pipe-Cutting Machine, Vol-2 Issue-2 2016, IJARIIE-ISSN (O)-2395-4396.
4. Numerical Analysis of Thermal Profile in Plasma Arc Cutting, Ali. Moarrefzadeh, International Journal of Multidisciplinary Sciences and Engineering, Vol. 2, No. 6, September 2011.
5. Profile Cutting Performed By An Industrial Robot, Retrieved July 29, 2015 From Https://Upload.Wikimedia.Org/Wikipedia/Commons/E/E5/Robotworx-Plasma-Cutting-Robot.Jpg
6. Profile Cutting withA CNC Machine, Retrieved July 26, 2015. Online Available At: Http://I.Ytimg.Com/Vi/Ruhgyoq2zKo/Maxresdefault.Jpg
7. Machinability of high asthenic stainless steels -results from turning tests (in Swedish), Swedish institute for metals report (1990)in -2676, sept
8. Trans, of same, ser. B, j. Engr. For industry., 88 (1966), pp. 142-146,