

Construction And Working of Low Cost Automation Sensor Based Continuous Cutting Off Machine

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Abstract- First step of to build something is to cut into desire shape. For this need accuracy. For this a need of machine to cut such specimen with desired size and shape. This will be possible by applying sensor. This is an automation sensor based cutting machine, it consists of cutting of bar at certain distance. Bar, pipe or any shape pipe can be cut by using this machine without more effort and saving valuable time in manufacturing process. This machine has automatic clamping. This machine can be widely applied in almost all type of industries. The pipe cutting process is a main part of the all industries. Normally the cutting machine is manually hand operated one for medium and small-scale industries. Automation in the modern world is inevitable. Any automatic machine aimed at the economical use of man, machine, and material worth the most.

Keywords- Pipe Cutting machine, Automation Sensor

I. INTRODUCTION

This is an era of automation where it is broadly defined as replacement of manual effort by mechanical power in all degrees of automation. The operation remains an essential part of the system although with changing demands on physical input as the degree of mechanization is increased. Degrees of automation are of two types,

1. Full automation
2. Semi automation

In semi automation a combination of manual effort and mechanical power is required whereas in full automation human participation is very negligible. In the process of production of any components from steel bar stock, the preliminary process is that of cutting-off of bar stock to length according to the finished size requirements of work piece. Automation can be achieved through computers, hydraulics, pneumatics, robotics, etc., of these sources, pneumatics forms an attractive medium for low cost automation. The main advantages of all pneumatic systems are economy and simplicity. Automation plays an important role in mass production.

II. LITERATURE REVIEW

1. Prof. Menghani, AkarshJaiswal, Nikhil Jain, and Mansi Borse, "Automatic Pipe Cutting Machine". Due to its compatibility, reliability it is able to cut bars of different materials. It provides an alternative to the existing automatic PVC pipe cutting machine, in terms of automating the pipe entry into the cutting apparatus, eliminates power.
2. P. Balashanmugm and G. Balasubramanian Research on "Pneumatically operated typical pipe cutting machine". D. c. valve and flow control valve is used for semi-automation. The pipe cutting machine works with the help of pneumatic double acting cylinder. The piston is connected to the moving cutting tool. The axes of the multi-axis machine are powered by electric motors and are synchronized to create a path for the torch and pipe that yield a desired profile. The synchronization of axes is accomplished either mechanically, via cams levers and gears, or electronically, via microprocessors and controllers.

III. CONSTRUCTIONAL FEATURE

Cutter motor: Cutter motor is 100-watt motor variable speed 0 to 8000 rpm with a standard 1:3 ratio gear head thus output speed of cutter will be 2600 rpm.

Linear slide and cutter feed arrangement: Linear slide comprises of two linear motion bearings on either side with guide bars and set of helical compression springs. The feeding action is done by a double acting pneumatic cylinder speed of the piston in forward direction i.e., the cutter feed is controlled flow gradual cutting action using a flow control valve in circuit, whereas the return stroke is standard (fast action). Springs are provided for fast return of the cutter head to original position.

Job clamping and guide arrangement: Job is guided in the job guide whereas the clamping is achieved using a set of clamps namely, the set- clamp (adjustable to accommodate

different size of job) whereas the movable jaw is connected to another pneumatic cylinder.

Job Feeding and Sensing Arrangement: For the semi-automatic version of the machine the feeding action is manual i.e., the job is fed in the job guide manually up to stopper. The proximity sensor is used to sense the job. The sensor then actuates the electrical circuit comprising of an electronic 8-pin relay and push button system.

Proximity Sensor and Electrical Circuit: Proximity sensor and the electronic relay circuit is a simple electrical circuit used to sequence the operations in the circuit. It can also be replaced by a limit switch arrangement but sensor is more reliable. The circuit decides the on/off of the 5/2 way direction control valve in the pneumatic circuit and thereby the clamping/cutting /return action.

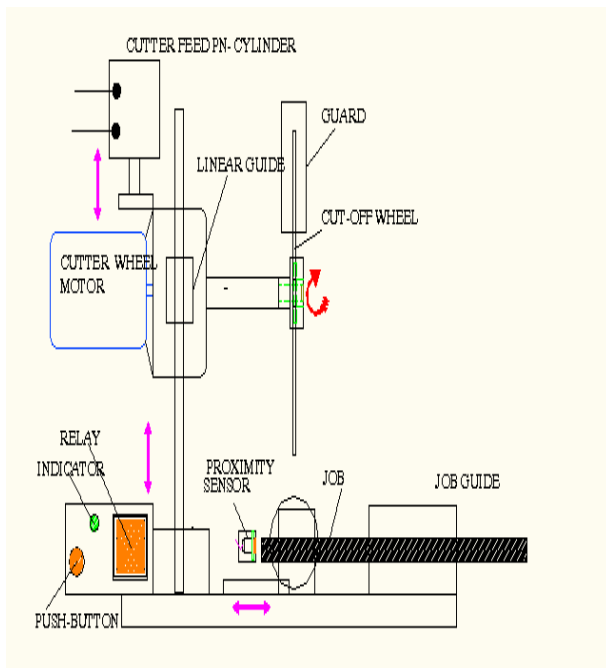


Fig: Constructional features

IV. WORKING

1. Feed job to length.
2. Proximity sensor senses the job circuit is 'ON'. Clamp cylinder operates to clamp the job.
3. Cutter feed cylinder operates to feed cutter in downward direction to cut the job feed rate is adjusted using flow control valve.
4. Press PUSH BUTTON Sensor is by-passed this makes circuit 'OFF'.
5. Clamp cylinder reverses stroke job is de-clamped.
6. Cutter feed cylinder reverses return strokes are faster to save idle time.

7. Feed job again continue steps 1 to 7.

V. ADVANTAGES

1. Job feeding up to stopper is sensor based so job size accurate.
2. Job feeding takes place during return stroke of the machine there by reducing the idle time further.
3. Minimal human intervention only limited to replacing the bar stock on to the machine.
4. The following machine is handy and easy to operate.
5. The cost of fabrication is low.

VI. CONCLUSION

Simultaneous operations can be done on this machine, reducing the total work time. Time consumption is less when compared to manual cutting. This machine is very useful for small-scale industries.

VII. FUTURE SCOPE

In the process of cutting wires of different length if in between faulty material is automatically detected by sensor and this sensor is placed on the mechanical cutter so that faulty part by the machine to throw it out.

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