

Automatic Drilling Machine

Dr.Mrs.A.Sumathi¹, A.M.Monalisha², S.Pessi Janet Blessing Mala³, V.Pooja Sri⁴, N.Poornima⁵

Head of the Department, Department of ECE, Adhiyamaan College of Engineering, Hosur, Tamilnadu, India ¹,

U.G. Students, Department of ECE, Adhiyamaan College of Engineering, Hosur, Tamilnadu, India ²³⁴⁵,

ABSTRACT: The main aim of this project is to automatize the drilling machine for particular materials to reduce drilling time. This proposed method reduces man power and error in measuring length. The main part of this system is PLC and HMI. Proximity sensors, stepper motor, stepper drive and pneumatic cylinder are interfaced with the PLC. According to the input measurements from the HMI, PLC will move the material with the help of motor. Accordingly drilling will be made and this reduces time and error in manual measuring.

KEYWORDS: PLC, HMI, Proximity sensors, Stepper motor, Pneumatic cylinder.

I.INTRODUCTION

Drilling machine plays a major role in manufacturing industries. With the development of technology the application of drill machine and its requirements started day by day. It proved great with its versatility and convenience in the metal processing, manufacturing and construction units. Even though many varieties of drilling machine is available, it is important to make it automated for its accuracy and speed. Every complex drilling process is transformed into the simple task by the use of automatic drilling machine. A definitive purpose of our project prototype is to improve the drilling process in industries, particularly for more specific task. In this case drilling machine is made automated with the help of PLC and HMI. A pneumatic cylinder is used to clamp the material both sides and the input is given to HMI. The sensor data will be sent to PLC. After sensing the base position PLC will move the motor based on customized HMI measurement. This makes drilling in the most simplest way.

II.RELATED WORK

In[1], This system is totally about to check the vacant places in the floor using sensors and PLC for parking system. This system has achieved the excellent performance to regulate the entry and exit of the car from several floors accurately. In[2], It is a cyclic drilling process. The cycle process starts when the starts switch is pressed, the linear motor is put in the place and the drilling head is in home position and the rotatory disc is used to bring the first work pieces to desired position.

In[3], it offers a complete introduction to the key principles and applications of programmable logic controllers(PLC). It provides basics of PLCs and provide introduction to the advanced PLC models, their function and programming capabilities. By reading this book readers can be able to get a good guidance to work with ladder logic for programmable logical controllers. and it also explains how PLC can be connected to external components in an operating control system[4]. In[5], a dynamic logic method based system is ordered in such a way to reach safety systems with programmable logic controllers. In[6], This drilling system deals with the same drilling method with more safety techniques with tools handling technique and error detection in the means of producing a valuable techniques. It is superior in performance and is more flexible in operation.

Organized by

Department of ECE, Adhiyamaan College of Engineering, Hosur, Tamilnadu, India

III.METHODOLOGY

A. SYSTEM DESIGN

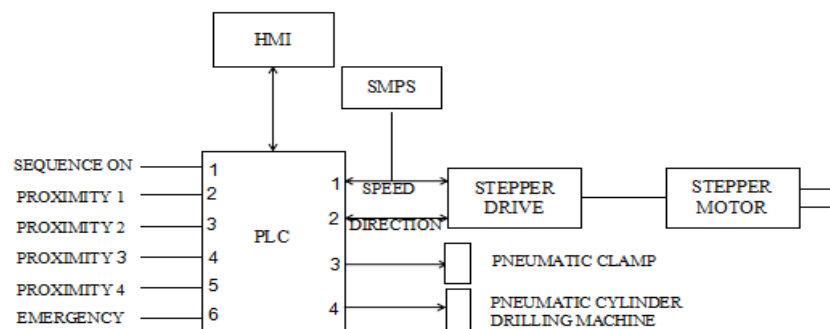


Fig 1: Block Diagram

Object to be drilled is kept on the conveyor. The direction control valve will supply air to the pneumatic cylinder from the air compressor which will clamp the drill object. The proximity sensors at its base position will be checked first and the data will be sent to PLC. According to this data, PLC will on the stepper motor through stepper drive. Object will get moved along the conveyor according to the input measurements. This measurements will be converted into number of rotations per cycle and delay will also be given for drilling. At this time delay drilling will be made manually and after completing the total drilling process object will be removed and conveyor is moved towards its base position.

B. Structure of conveyor

The conveyor is specially designed to carry out the drilling material as well as clamping process on it. The proximity sensor is placed in the both ends of the conveyor.

C. Stepper motor

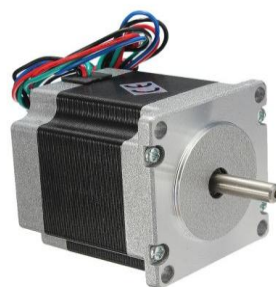


Fig 2: Stepper Motor

The stepper motor is used for the movement of drilling object. The motor is 24V DC motor with the stepper driver for bipolar movement.

D. Clamping system

The clamping system consist of pneumatic cylinder direction control valve and flow control valve. Operating pressure of pneumatic cylinder is 0.5-8 bar. The direction control valve is used to supply the air to pneumatic cylinder from air compressor. Flow control valve is used to control the flow of air. Operating pressure 0.5-10 bars.

IV. EXPERIMENTAL RESULT

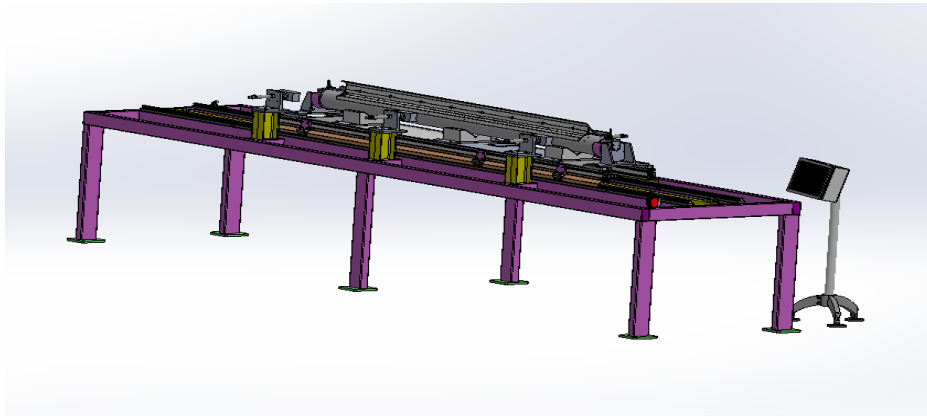


Fig 3. Experimental Setup

The existing drill machine was successfully made automated using plc control system. The motor is controlled in different speeds according to work piece and customized inputs through a driver. The material will be moved after sensing from its base position and its movement will be based on length and spacing, a time delay will also be given from PLC for each drills. Once the drilling process is completed then the material will be removed and conveyor will return back to its initial position.

V. CONCLUSION

In this paper the proposed automated drilling machine is considered to produce good precision accuracy and reduces human efforts, error and time. The PLC used to control the operation makes the work much easier than manual measuring and pitch movements. It is also safe system which converts complex drilling into simple process.

REFERENCES

- [1] A. Albagul, K.Alsharaf, M. Saad, Y.Abujeela, "Design and fabrication of an automated multi level car parking system", from manufacturing Engineering, for Automatic control and robotics, 2013.
- [2] Yousef M. Abueejela, A. Albagul, Ibrahim and Obida M. Abdallah, "Automated drilling machine based on plc", International Journal of Innovative and science, Engineering and Technology, March2015.
- [3] John. W. Webb, Ronald A., Reis, "programmable logic controllers and its applications", in PHI Learning.
- [4] John R. Hack Worth, Frederick D. Hackworth, Jr., "programmable logical controllers programming methods and its applications", prentice Hall India.
- [5] J. Marcos, E. Mandado, C.M. Penalver, "Implementation of fail-safe control system using programmable logic controllers", Proc.IEEE/IAS Int.Conf. Industrial automation and control, 1995.