Scientific Journal of Impact Factor (SJIF): 5.71

e-ISSN (O): 2348-4470
p-ISSN (P): 2348-6406

International Journal of Advance Engineering and Research Development

Volume 5, Issue 03, March -2018

SENSIBLE DRILLING OPERATION

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Abstract – *Involvement of automation manufacturing technology plays an important role in enhancing the quality of process & products. An automated device which replaces manual involvement is an extraordinary contribution to the mankind. In this paper, stress is laid on the designing of an automatic drilling system so to perform drilling operation automatically inefficient way. Estimating the drilling depth while drilling manually through a conventional drilling machine is extremely impossible, often the job will be failed due to the over drilling in many cases, after completing the drilling work, it is very difficult to measure the depth; especially thin holes depth can't be measured. Therefore an automatic drilling machine that performs the function of drilling according to the drilling depth generated. It is aimed to drill the job up to certain specified depth. The actuation & control part is taken care with the help of actuating elements like DC motor & by programming it effectively using microcontroller. Finally the prototype model is developed in order to facilitate drilling operation with ease & accuracy. The drilling operation is performed by the combination of the movements of the drilling system & the base on which work piece is kept for drill operation. Innovative design & efficient programming have been merge to generate a device which will significantly contribute to the field of production.*

Keywords- *IR Sensor, Conveyor Belt, DC Motor, Atmega 8 Microcontroller, Pneumatic Cylinder.*

I. INTRODUCTION

In order to gain a competitive edge in today's manufacturing market, a streamlined approach to the manufacturing process is required which focuses on increasing throughput while reducing or eliminating operator intervention. The most effective means for accomplishing this task is through machine automation. Automation is the use of computer to control industry machinery, replacing human operators. It is a step beyond mechanization, in which human operators are provided with machinery to help them in their jobs.

A manufacturer's primary consideration for automating a manufacturing system should be the machine tool and its control software. Advanced machine control software offers manufacturers the ability to dramatically reduce machine downtime, labor costs and human error. In the age of computers and innovative technologies, industrial automation is becoming increasingly important in the manufacturing process because computerized or robotic machines are capable of handling repetitive tasks quickly and efficiently. Machine used in industrial automation are also capable of completing mundane tasks that are not desirable to workers. Also the automatic drilling machine saves money.

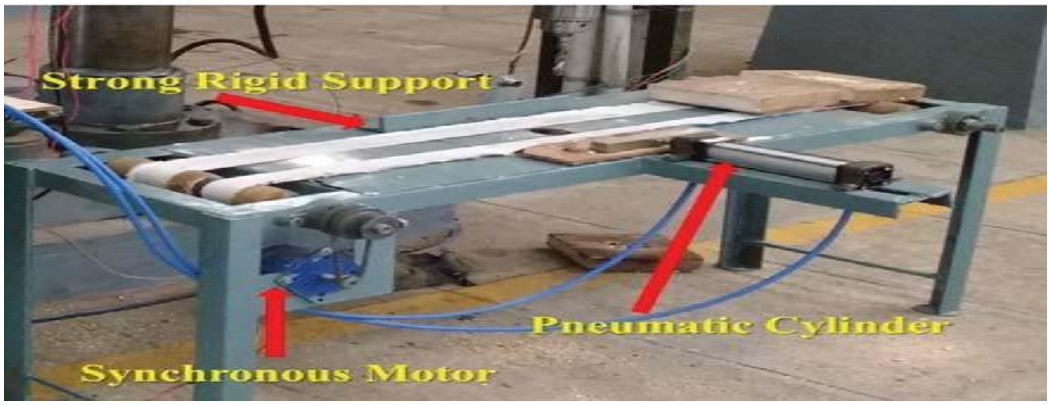

FIG. 1

Also, normal machines like portable drilling machines, power feed drilling machines, etc. are quite common; we can find these machines everywhere. This type of machines is used for drilling a through hole over the job; machines cannot be used for number of machining operations for specific applications. Man power is key factor for operation, we will face human errors and not get desired output from machine.. It is time consuming for doing repeated multiple jobs; these are all its drawbacks.

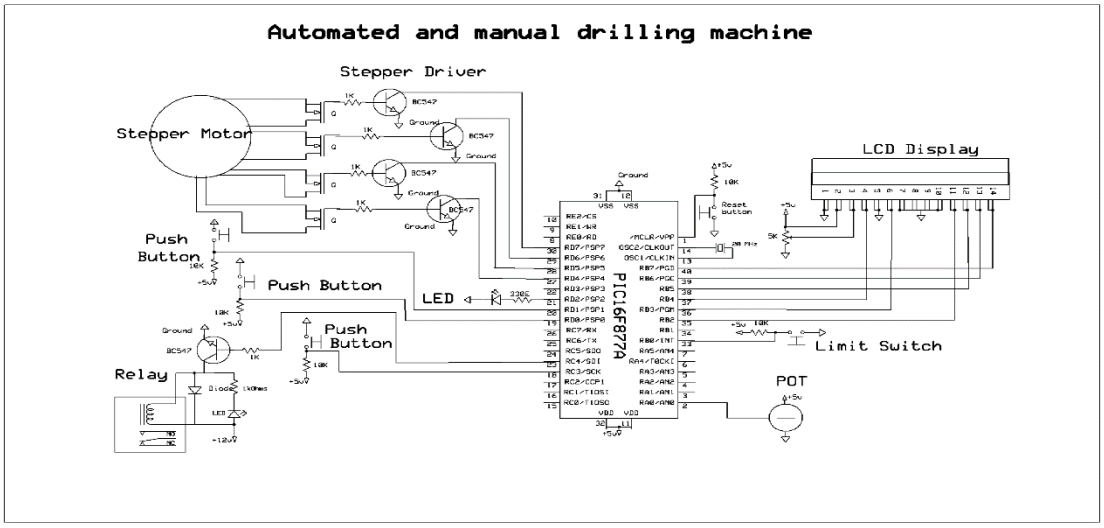

FIG. 2

Automated drilling machine overcome all these problems by drilling holes automated preprogrammed controller according to our observation, the automatic drilling machine is quite new & there is no substitute available in the market.

II. LITERATURE REVIEW

AshishMaurya, ChandrashekharPatil,andPriyankaChavan,are developed Automatic indexing mechanism for drilling machine whose summary is as provided. In today's manufacturing market it very important to make a product of superior quality as well as the productivity of machine to survive in market.so, in this using of indexing mechanism can make simile drilling machine partially automatic in such kind of job. By using of such kind of mechanism we can increase the drilling efficiency of simple drilling machine.so, in less labor cost we can archive.[1]

May PhuePhueLwin, KyawThiha,is research on Control system of an automatic drilling operation.The important stage in electronic production is bread board or PCB. to creating holes on pubs and as well as on mechanical components with different kind of size of holes is difficult some times by automatic drilling machine as well as semi-SENSIBLE DRILLING OPERATION. By using this system we can connect several automatic and semi-automatic machines for drilling at once. By this we can archive high production rate with different size of holes also.[2]

Rohit D. Mardane, U.D.Gulhane, A.R.Sahuis Design and fabrication of automated attachment for positioning bed of drilling machine with respect to cad model. This is the kind of attachment which is able to convert any drilling machine. We can achieve automating in machines easily. By this attachment we able to get the exact position of hole on job placed bed by its CAD model. Also this can work with CNC machine as well as simple machine with some extra fabricated elements [3]

ShaikhNoorfarooque, Ansari Mohammed Faizan, JavedShaikh, Pragati Palis published jurnal on Automated PCB drilling machine with efficient path planning. This machine is specially made to make pubs. this machine firstly read the security diagrams and according to circuited diagram it will make a hole on PCBs. so, we'll doesn't get the extra holes on pubs. By this special kind of circuits for application so, the confusion will be minimized. [4]

With reference to paper by PLSC alwis, A.S Premarathna, Y.P. fonseka. On Automated printed circuit board (PCB) drilling machine with efficient part planning SAITM-RSA 2014. The author presents the design of PCB drilling machine. Machine uses a path planning algorithm which is capable of estimating an efficient traversing path for the drill bit travel time. [5]

GautamJodhet. Al. in their paper given details of design of low cost CNC drilling machine. The important points identified our design parameters consideration and configuration selection from design point of view and it's suggest that configuration is most suitable for better rigidity, accuracy and easy operation programming. [6]

The paper G. Niranjanet. Al. on topic Automated drilling machine with depth controllability. It highlights the importance of depth of cut and its controllability. To eliminate the problem the author suggest a way by controlling mechanical movements through programming the microcontroller which will interfaced with drilling depth feed motor. [7]

N. Balasubramanyam and Prof. Smt. G. Prasantiy has mention on topic Design and Fabrication of an Automatic PC-Based drilling machine as follow the paper suggested that the program can be prepared in C language with a systematic approach that implemented to control motor independently.[8]

P.O. Boucharda, et.al this pamphlet was published on "Numerical modeling of self-pierce riveting from riveting process modeling down to structural analysis" focused on the numerical modeling of the SPR process. They had used the finite element software to enables the model for large deformation of elastic–plastic materials for 2D and 3D configurations. A Lemaitre coupled damage model had been implemented to deal with damage during the process and fracture was modeled using the "kill element" technique. [9]

A.S. AdityaPolapragada, et.al published the paper on pneumatic auto feed punching and riveting machine in (IJERT). In this paper they had design and fabricate the unit and stated the importance of the pneumatic press tool had an advantage of working in low pressure, even a pressure of 6 bar was enough for operating the unit. The die used in this was fixed such that the die of required shape could be used according to the requirement. [10]

A. M. Takale et.al was focused on "Design & manufacturing of multi spindle drilling head (msdh) for its cycle time optimization", This paper deals with design and development of multispindle drilling head for cycle time optimization of the component. Their attempts have to improve the productivity by reducing the total machining time and combining the operations. They have design the major components of multispindle drilling head like main spindle gear and main spindle and calculate the stress analysis. By using multispindle drilling head productivity will increase. [11]

Xiao Hong, focused on "Multi-Objective Optimization Method for Automatic Drilling and Riveting Sequence Planning", this article presented a new multiobjective optimization method based on ant colony optimization (ACO). Multi-objective optimization model of automatic drilling and riveting sequence planning is built by expressing the efficiency and accuracy of riveting as functions of the points coordinates with multiple degrees of freedom. The cost of time and the precision of automatic drilling and riveting are described by means of the points coordinates. [12]

Ian Pearson et.al focused on "Self-pierce riveting for sheet materials". They discussed on mechanics of joint formation, types of defects, and the main mechanical properties of SPR joints such as strength, corrosion properties and free vibration properties. The prediction of joint distortion when SPR is used to create structures and the cost effects of the technique are introduced. Prediction of distortion caused by the assembly process and the cost effectiveness of the technique are also introduced. [13]

Prof. P.R. Sawant et.al had been published a paper on "Design and development of spm-a case study in Multi drilling and tapping machine", This paper discuss the case study and comparison of productivity of component using conventional radial drilling machine and special purpose machine(SPM) for drilling and tapping operation. [14]

III. CONCLUSION

The project "Sensible drilling operation" was designed such that the drilling machine is controlled automatically to set value by microcontroller based system. It drills holes automatically over a job according to the sense by sensor for data programmed through a key board. These machines can be used for number of machining operations for specific applications. Drilling depth can be estimated properly. It is aimed to drill the job up to pre-set depth. The actuation & control part is taken care with the help of actuating elements like DC motor & by programming it effectively using microcontroller. Finally the prototype model is developed in order to facilitate drilling operation with ease & accuracy.

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