AUTOMATIC INDEXING MECHANISM FOR
DRILLING MACHINE

Ashish Mourya¹, Chandrashekhar Patil², Priyanka Chavan³,
Manjur Sande⁴, Sarang Pisal⁵
¹,²,³,⁴,⁵ UG Student, Department of Mech. Engineering, AITRC Vita,
Shivaji University Kolhapur, (India)

ABSTRACT
Quality and productivity play important role in today’s manufacturing market. Automation providing high end
quality. Now a day’s due to very stiff and cut throat competitive market condition in manufacturing industries. The main objective of industries reveal with producing better quality product at minimum cost and increase productivity. Drilling machine is most vital and common machine used for producing hole operation use for produce machine part with desire surface quality and cost constrain. To obtain main objective of company regards quality and productivity. In the present project an attempt is made to reduce the effect of machining idel time parameters because of mounting, dismounting, marking etc that are influences on responsive output parameters such as time of producing hole, quantity of job, quality of job. this is done by using indexing. The effort to investigate optimal time of producing hole and their contribution on producing better Surface quality and higher Productivity with less cost automation.

Key words: Automation, indexing, manufacturing industry, productivity, quality.

I. INTRODUCTION

The process of drilling along PCD is quite commonly used. Most of TWO WHEELER vehicles have disc brakes which have holes along PCDs, couplings, flywheels etc. To meet the demand of such jobs, the manufacturing is carried on NCs, CNCs etc. The main difficulty in such machining technology is requirement of huge capital and skilled operators. Hence this Drilling Machine Indexing Mechanism focuses on designing simple drilling table where in the drill bit won’t be carried from one position to other but the job itself will be aligned in such a fashion that on simple rotation of worm the new position will be achieved.

Based on simple engineering knowledge, assembly is designed and fabricated so as to reduce over head losses when it comes to drilling along PCD (Pitch Circle Diameter). Indexing process is well known to us when it comes to gear manufacturing but we are introducing same process but without bulky indexing plate assembly in drilling operation. The construction consists of assembly of worm and worm wheel mounted on vertical shaft which further carries Rotary round table on upper side with sensor. The indexing table is powered by small electrical motor. The speed of table is control by the speed regulator. The operator needs to rotate worm through few degrees to achieve desired Position of the job which contains the several holes.
Compared to available indexing mechanism the cost of this Drilling Machine Indexing Mechanism is quite less. Again, as compared to other automated machine the investment here is quite low. Hence this Drilling Machine Indexing Mechanism holds low initial cost, low operating cost, low maintenance cost & low construction cost.

Since no electricity is used to generate rotational motion there are no electric losses. These days manufacturing deal with automation and hi-tech processes consuming huge power supply. In such scenario our Drilling Machine Indexing Mechanism provides not only the speed but also Manual Handling.

II. CONSTRUCTION OF INDEXING MECHANISM

Indexing mechanism is made up of mainly worm and worm wheel. In this setup the worm and worm wheel setup is coupled with vertical shaft on which detachable rotary table is connected. For the automatic rotation of worm and worm wheel setup small motor is coupled with help of v belt. The automatic rotation of the rotary table is controlled by using sensors according to requirement. As job which has to get drilled is mounted on the rotary table it have certain hole or clamping setups as per suited to job.

![Fig. 1 Construction of Automatic Indexing Mechanism](image)

III. INSTALLATION OF INDEXING MECHANISM

The automatic indexing mechanism is portable device and gets mounted on any simple drilling machine. It can be placed rigidly on the work table of drill machine without any special arrangements.
IV. WORKING OF INDEXING MECHANISM

In this mechanism the upper round table is rotate which has marking according to requirement. Marking is in angle in which we have to index the table. This marking is nothing but metallic stopper which can detect by the proximity sensor and proximity sensor simply break the circuit of current to stop the rotary table. This causes the indexing in accurate angular displacement.

V. LITERATURE SURVEY

5.1 Ranjeet Mithari and Amar Patil [1]

Abstract - This paper describe the welding Positioner with auto indexing which is very important for mass production industries related with circular welding. As it depends upon the skill of worker to move electrode along the welding line. This special device can rotate the job at fixed rate to assist the welding process for circular components and ensure good profile and homogenous welding. This model has applications in small cylinder welding, compressors, and bottle filling plants etc. Automated welding Positioner machine for circular weld is totally satisfying the requirements. For this system Worm and worm wheel, Cummutator motor, Belt drive, Proximity sensor, Ball bearing, Electronic relay, Inching switch, inputs are required.

5.2 Funaru, M[Arian]; Mihaila, I[Ucian]; Pascu, M[Arius] & Andrioaia, D[Ragos][2]

Abstract: Growing performance demands in the mechanical manufacturing field have lead to a great development of the machine tools domain, during the past decades, regarding especially the productivity and the manufacturing precision. When equipping a machine tool with an automatic tool changer and an automatic pallet mechanism, the obtained result is a machining center. For single or small series products, mult-iaxis machining centers fulfill the precision and productivity requirements, through the advantages of a reduced auxiliary time and reduced operating errors. This paper presents a new technical solution of the index table mechanism used on multi-axis machining centers, which significantly helps reduce the auxiliary time in the manufacturing process. The mechanical structure of the table mechanism described in this paper offers the possibility to obtain a very high positioning precision, using a curvy coupling and a hydraulically driven table clamp/unclamp mechanism.

5.3 V.J.Panchal, B.M.Garala, G.D.Acharya[3]

Now a day’s machining of component within single setup is more important concept for manufacturing of any product. As single set up machining results dimensional and geometrical tolerance within specific limit, this concept with specific product like rotary table, indexing table, work holding devices, special jig and fixtures etc. with machining center is more predominate. Single setup concept will increase productivity with cost effectiveness and consistent accuracy. The paper deals with the rotary indexing mechanism which is used for getting angular motion in required time. Different types of indexing mechanism are available in market like
cylindrical cam with roller follower, duplex worm gear based, and Geneva mechanism. The Paper covers in designing of indexing mechanism, cam and follower and its motion curve is major part for creating its profile for getting particular indexing with required time, accuracy and cost.

VI. RESULT & TESTING

A Round Job160mm in diameter and 50mm in height on which 4 Holes is to be drilled in 90 degree in circular manner. It is made of Mild Steel (MS) material. The some jobs were drilled with using and without using indexing machine. During mass production on drilling it is found that job without indexing takes much time to complete the drilling than the job with indexing mechanism. Observation of drilling the holes with using and without using indexing mechanism is given in as-

**Observation of Total Machining Time**

<table>
<thead>
<tr>
<th>Sr. no.</th>
<th>Material</th>
<th>No. of jobs</th>
<th>Total Time required (with marking &amp;drilling hole) in hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without indexing mechanism</td>
<td>1</td>
<td>MS</td>
<td>1000</td>
</tr>
<tr>
<td>With indexing mechanism</td>
<td>2</td>
<td>MS</td>
<td>1000</td>
</tr>
</tbody>
</table>

Above result is for unskilled labor.

VII. CONCLUSION

From above result we can say that we reduced the total indexing mechanism can reduce the total manufacturing time during mass production in simple drilling machine. So it reduces the cost of labor and increases the production. This mechanism also provides indexing in drilling operation.

REFERENCES


