

Study of Development and Fabrication of multi-spindle drilling machine with varying Centre distance

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Abstract - The challenge of developing new machining industries and company is mainly focused on the achieving of best quality, time saving operation for increasing the of production, less removal of materials of cutting tools, hence rising the performance of the instrument. Now a day challenge of market, manufacturers and giving better performance are compelled to be more responsive to the customer's demands regarding more quality, specific quantity, minimum cost, and within time. Productivity can be increased by decreasing the overall machining time and combining the machining operations etc. The better direction to increase the production rate (productivity) along with quality and quantity is by use of special type of modifying machine. The Productivity and performance of the available or existing drilling machine will be increased by manufacturing, designing and Fabricating the newly type of Multiple Spindle Drilling Head.

Key words: Multi-spindle drilling attachment, Productivity, Accuracy, Design, Construction and Manufacturing.

1.1 INTRODUCTION

Multiple-spindle drilling machines are used for increasing the mass production rate and saving of important time which are required for producing the holes with help of drill, huge time minimise where large samples of products or jobs having number of holes are to be drilled. Multi-spindle head machines are used in mechanical related factory in order to rising the productivity of machining processes. It is commonly used to drill holes for different pitch circle diameters. The centre distance between the spindles can be managed in any position as per the requirement of the various product. For keeping the centre distance between the drill spindles variable, they are connected to the main spindle by an Adjustable Transmission System (ATS). Now a day in market the customer requirement and demand the product should be in greater quality, right quantity, less cost, & at right time. Therefore, it is essential to improve productivity as well as quality of the jobs. The only way to achieve this is by using multi spindle drilling head. Designing of SPM is decided upon the principles of minimization of cost, improved productivity and high safety etc.

Problem Identification

- 1) The equipment is drive on electricity and required large power.

- 2) When various attachments are attached to machine so cost is high and machine construction is heavy. So, yet there no other machine developed which consider cutting and drilling processes in one set up.

In the previous drilling instrument only one workpiece can be drilled at a time. To increase the productivity, a special purpose equipment is required which drill the holes large than one at a time. Todays, the customer demands the product of right quality, right quantity, and right cost & at right time. Therefore, it is necessary to improve productivity as well as quality. This is development and fabrication of multi-spindle drilling machine by using varying the Centre distance.

Methods of Multi spindle

- a) Movable Multi-Spindle Drilling Head: In this method the center distance between drilling spindle can be increased according to requirement.
- b) Fixed Multi-Spindle Drilling Head: In this process center distance cannot varies from its mean position.

Features of both the type multi spindle drilling head are:

- 1) With the help of multi-spindle drilling heads, improving the productivity and time is minimized for multiple hole production.
- 2) Multi-spindle drilling giving the positional accuracy and very good precision.

1.2 METHODOLOGY

Proposed work started with the problem identification in industrial process of manufacturing of different type of saddle clamp. By collecting available information and specification further solution finding approached. It is found that Quality and productivity play important role in today's manufacturing market. Multi-spindle drilling head is the cheapest and most efficient way to improve the productivity.

FLOW DIAGRAM OF METHODOLOGY

Methodology used for whole processing Design And manufacturing and constructing the multi-spindle drilling head is given below; this methodology gives way about how

work is to be carried out in systematic way. It is standard process of describing process, how it is done in simplest manner.

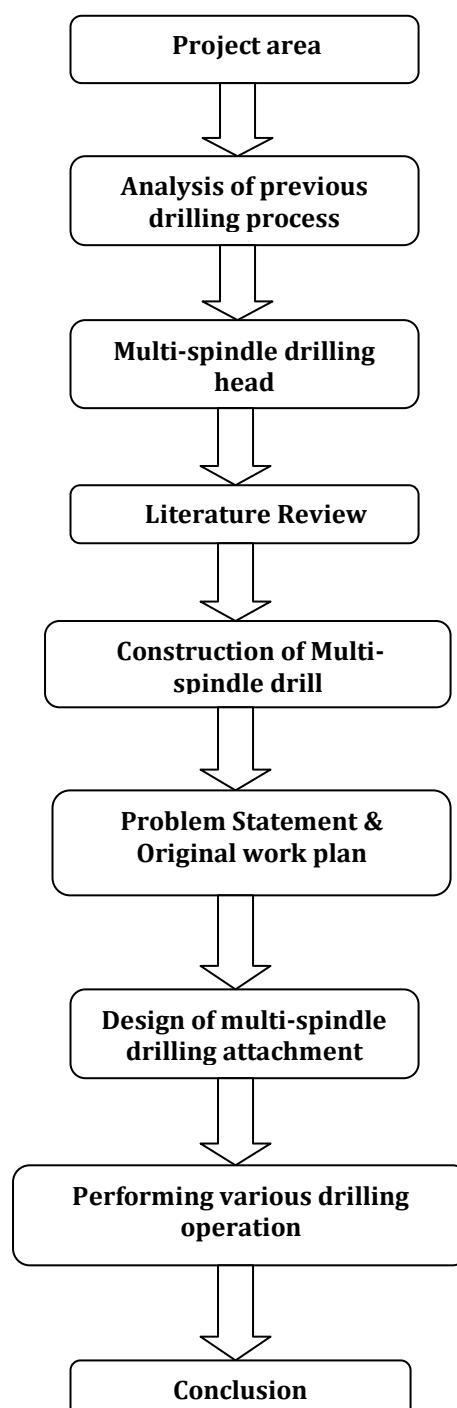


Fig.1.2. Methodology flow diagram

1.3. FUNDAMENTAL REQUIREMENT OF MULTI-SPINDLE DRILL DESIGN

1. QUALITY PRODUCT:

Product should get manufacture within given base dimension & tolerance.

Productivity should maintain within 95% rejection of parts should not more than

1% product time should not exceed than 8 second per product.

2. EASE OF DRILL HANDLING:

Drill should not get damage while loading and unloading and not gets fail during drilling.

3. EASE OF DRILLSETTING:

Drill setting time should not more than 15 minutes. Drill setting tools to be provided with tool.

4. EASE OF DIE MAINTENANCE:

Drill should produce large number of holes with the help d unit without any minor maintenance.

5. REDUCTION OF MANUFACTURING COST:

Manufacturing cost should be reduced by 50% than existing process.

6. REDUCTION OF SCRAP MATERIAL:

Material scrap should not more than 10%

1.4 CONSTRUCTION AND VARIOUS PARAMETER

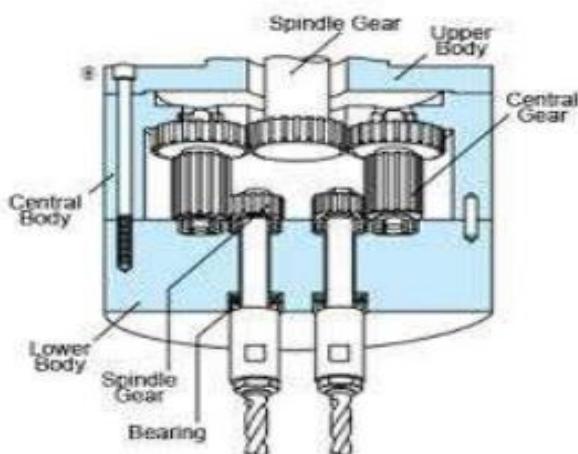


Fig.1.4.1. Multi-spindle drilling machine

The various types of component used in these machine-like gear, lower and upper body, bearing, shaft and keys, drill tool and chuck, adjustable transmission shaft.

Information about multi-spindle drill parameter and previous drilling machine.

Drill beats

Drill bits are cutting instrument which is generally used to made up of circular and cylindrical holes. The drill beats

fitted in a tool called a drill, which revolves them and provides torque and axial moment force to generate the hole. Specially bits are also available for non-cylindrical size shape holes.

Drill shank

The shank is the part of the drill bit fitted by the chuck of a drill. The cutting edges of the drill bit are at single end, and the shank is at the another. Drill bits has special decided sizes, described in the drill bit sizes article. A comprehensive drill bit and tap size chart lists metric and imperial sized drill bits alongside the necessary screw tap sizes.

Drill chuck

A drill chuck is a mainly three-jaw chuck which is generally used to hold drill bits or their necessary. The high accurate chucks use in ball bearings to minimized friction in the mechanism and increasing drilling torque.

Indexing plate

The revolving table permitted a workpiece to be rotate in a circular direction. This part involving of a base and a rotary table. The base of an easy direct setting rotary table is graduated through 360° in increasing of 60 seconds.

Leadscrew

Linear motion can be getting by means other than through the use of lead screws. Chain drives along with belt and pulley run do not necessary pumps and support hardware as do hydraulic and pneumatic process. They can carry very minimum to very large loads at high speeds when necessary.

Speed regulator

It is an equipment which is used to control or minimizing and maximizing the speed of rotation or revolution of motor. It consists of a series of coils to manage the speed. The reactance of the series field and armature windings must be decreased as much as practicable.

Indexing mechanism

Two important precision mechanisms were introduced to getting the requirements or necessary of accurate spacing: the rotation or circular milling table and the dividing head. These mechanisms are called indexing instruments. The revolving head and dividing head are mainly used to index (locate) one surface or angular dimension in a right relationship with other. These mechanisms have parts that permit them to serve also as work holding instruments.

Previous drilling operation

Drilling is a process of producing circular holes in a rigid body or material or enlarging existing holes with the use of multi tooth cutting tools called drills or drill bits.



Fig.1.4.2 Drilling machine

SUMMARY

With the help of this process parameter, we can drill two holes at a time with previous of increasing Centre distance between two drilling spindles. It has advantage of portability. The size of machine is minimizing than the previous machine so it is very easy to move any direction from one place to another.

ACKNOWLEDGEMENT

We work on this project by the support of our college and under the valuable guidance of project guide and coordinator, who guided us at any difficulties come across.

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