" FABRICATION OF COMBINE DRILLING AND TAPPING MACHINE "

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Abstract - *Tapping and drilling are frequently used in mechanical working. Previous researches on tapping and drilling has mainly focused on cutting force variations, drill and tap wearing, and drill and tap design.A novel performance test system of tapping and drilling for a computer numerical control (CNC) machine tool is established in recent techniques. The target of the mass production is to increase the productivity and increase the accuracy. This is done by reducing the set up cost and manual fatigue. Trial and error method is usually practiced until the axis of the hole is properly aligned with the axis of the drill. In such a situation a lot of time is being wasted to maintain the accuracy. Eventually it increases the operator's fatigue. The main aim is to locate, hold and support the work securely so that the required drilling and tapping operation can be performed. Our machine will consist of combination of drilling and tapping operation with the help for speed reduction gear box. As drilling requires high RPM and tapping requires low RPM to perform the drill and internal threads operation. A collect is mounted vertically on the shaft of motor and gear box reduces the speed as per requirement of operation.*

***Key Words*: DRILLING , TAPPING**

1.INTRODUCTION

A process for producing internal threads using a tool (tap) that has teeth on its periphery to cut threads in a predrilled hole. Drilling is a cutting process that uses a drill bit to cut a hole of circular cross-section in solid materials The main purpose of this machine is to perform both drilling and tapping operation on single machine .This machine will consist of combination of drilling and tapping operation with the help for speed reduction gear box. As drilling requires high RPM and tapping requires low RPM to perform the drill and internal threads.

1.1 DRILLING PROCESS :

The drilling machine is one of the most important machine tool. In a drilling machine holes may be drilled quickly. The holes is generated by the rotating edge of a cutting tool known as the drill which exerts large force on the work clamped on the table. As the machine exerts vertical pressure to originate a hole it is also called as a "Drill Press".

1.2 TAPPING PROCESS:

Tapping is the operation of cutting internal threads in a hole using a cutting tool called Tap. A tap has cutting edges in the shape of threads. When the tap is screwed into a hole it removes metal and cuts internal threads for tapping the hole drilled will be smaller than the tap size.

Tap drill size = 0.8 * Outer diameter of the threads

To understand the application and importance of the involvement of semi automation in conventional drilling machine in manufacturing. This paper will cover up procedures for maintaining and setting up the work, proper methods of selecting tools, work holding devices to get the job

2. CONSTRUCTION AND WORKING

Column: The column is the vertical member of the machine, which supports the table and the head containing all the driving mechanism. The Column should sufficiently, rigid so that it can take up the entire cutting

Table: The Table is mounted on the column and is provided with 'T' bolts for clamping the work directly on its face. The table is made as a rectangular in shape. the table moves up and down over the column of the machine. The top of the table is machined and is used for holding work pieces. It is made of Cast Iron.

Motor: It is a 1 Phase 0.5 H.P. Motor and runs at 1320 rpm & is mounted on the bracket.

V-Belts: A single V-Belt of A-Type cross section is used. It is used to transmit the power from Motor Pulley to Spindle Pulley with help of step cone pulley.

Worm and worm gear : It consist of Worm with 4 teeth and Worm gear with 30 teeth

Bevel gear : The bevel gear arrangement is used to transmit motion in right angle to main spindle . It consist of 16 teeth on each gear.

Sleeve arrangement : The sleeve arrangement is provided for locking (connecting and disconnecting) system between main shaft and power transmitting shaft.

Chuck : The 3 jaw chuck is used for holding the tool (i.e. drillng and tapping tool)

Table -1: Sample Table format

Part table			
PART	**SPECIFICATION**	**PART**	**SPECIFICATION**
Motor	0.5 hp, 1320 rpm	Drill Bit	7mm
Worm	4 teeth	Tap Tool	8mm
Worm Gear	30teeth	Chuck	3 jaw
Bevel Gears	16 teeth	Step Cone Pulley	2-5 inch

3. OPERATION :

The Drive mechanism of this machine is illustrated in fig.1. As the motor is switched on,the motor shaft starts revolving & hence, the V-pulley mounted over it. This,through the V-belt,transmuts motion and powerto the other V-pulley mounted over the Drill spindle.Thus,spindle starts rotating and therefore,the cutting tool(drill). When the drill is required to be fed into the work, it is pressed against the work by means of Feed Handle. Different spindle speed can be obtained by shifting the V-belt to different pairs of driving and driven pulleys, while the motor continues to rotate on the same speed. However, normally there is no arrangement for automatic feed onthis machine.

On the other hand, the tapping with reversing mechanism is provided. In this mechanism the pulley power transmission is disconnected with the help of sleeve(locking arrangement). In this the power is transmitted from motor shaft to the main shaft with help of worm and worm gear & bevel gear arrangement. Thus, the RPM of the main shaft is reduced with the help of worm and worm gear arrangement (From 1320 rpm to 90 rpm).

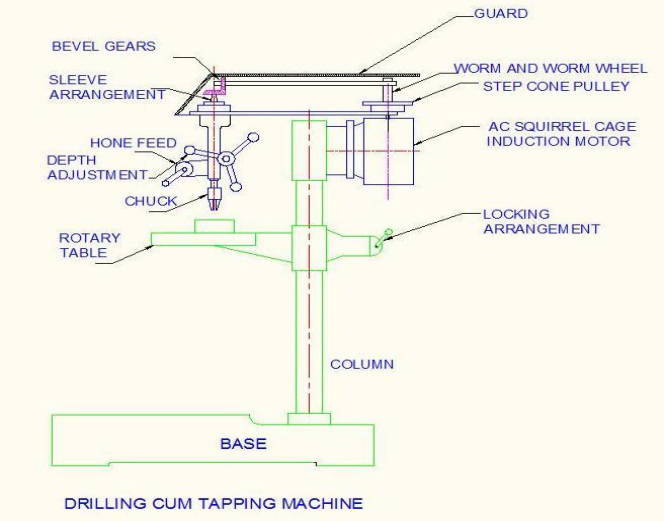

Fig -1: DRILLING AND TAPPING MACHINE

4.Calculation

- Speed of worm Nw = 1320
- Speed of worm gear Ng= 170 (Assume)

Now ,

Velocity Ratio= Nw = 1320 =7.8

Ng 170

If V .R. is in between 6-12 then teeth on the worm (No. of start)

n= T_w=4 (from D.D.B by B D Shiwalkar p.g no. 176)

$N_w*T_w=N_g*T_g$

$1320*4=170*T_g$

Tg=30

PCD of gear Dg=m*Tg=30m

Velocity Vp= πDgNg/60*1000

= π*30m*170/60*1000

= 0.267 m/sec

Design power, Pd= Pr*Kl (from D.D.B by B D Shiwalkar p.g no.112)

=450*1.75 (Kl=1.75 from TB XI-5)

=787.5 Watt

Now, Tooth load(Ft), Ft=Pd/Vp (from D.D.B by B D Shiwalkar p.g no.175)

=787.5/0.267

=2.94*103

Beam strength, FB=So*Cv*b*Y*m (from D.D.B by B D Shiwalkar p.gno.175)

So=84 Mpa

Cv= 0.75 (Trial value)

b= 2.38 Pc+6.25 =2.38 (π*m)+6.25

= 7.47m+6.25

Lead angle =$\lambda=\tan^{-1}(Ng/Nw)^{⅓}$

=26.79º

Pressure angle= Φn=25º

Modified Lewis Factor, (from D.D.B by B D Shiwalkar p.g no.167)

$Y=0.314+0.0151(\Phi_n-14.5)$

=.314+0.0151(25-14.5)

=0.472

$F_b=84*0.75*(7.47m+6.25)*0.472*m$

$=222.56\ m^2+186.06m$

Now, Fb = Ft

$222.56\ m^2+186.06m=2949.44/m$

Therefore ,

module **(m)=2.11**

≈ 3 mm (from D.D.B by B D Shiwalkar p.g no.169)

Dia.of gear= 30*m=30*3

Dg=90mm

Dia.of worm=2.4*Pc+27.5

=2.4* π m+27.5

Dw= 50mm

5. ADVANTAGES

The following are the advantages of this machine:-

1. Minimum number of components, so the maintenance of the machine is easier.

2. No skilled operators are required.

3. Enables high production rate

4. The machine is less expensive.

5. Consumes less floor area.

6.Conclusion :

Our attempt is small in the whole of the Engineering world, but it can do better than any other machine for the same purpose with less cost. This design is simple and compact in size. Therefore it is affordable by the small scale industries

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