

Case Study on Maintenance of Tapping Machine

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ABSTRACT

Now days, there is a tremendous development in the production industry and their relevant machinery to improve the productivity. But still, in small, medium and some large scale industries uses the conventional methods in some of the operations. Thread tapping is one of them. Tapping is the method to produce the fine thread inside the drilled hole on the plate. Most of the industries uses the conventional method says hand tapping.

1. INTRODUCTION

There is a tremendous technological development in the manufacturing industries are making large amount of effort for their mass production with best quality products having higher reliability and economical in cost. Now days the hand operated machines are replaced with the application of automation in automatic or semi automatic machines which utilized to improve the productivity. Tapping may either be achieved by hand tapping by using a set of taps first tap, second tap & final (finish) tap or using a machine to do the tapping, such as a lathe, radial drilling machine, bench type drill machine, pillar type drill machine, vertical milling machines, HMCs, VMCs. Machine tapping is a process to produce the female threads inside the drilled hole. Machine tapping is faster and generally more accurate because human error is eliminated. Final tapping is achieved with single tap. Although in general machine tapping is more accurate, tapping operations have traditionally been very tricky to execute due to frequent tap breakage and inconsistent quality of tapping.

2. TAPPING PROCESS

The tapping process is activated using a multi point cutting tool called "TAP". The Tap is held in the main spindle with the help of collect Chuck / Drill chuck. The spindle gets its drive power from the motor by means of the V-belt. The travel of the "TAP" over the entire thickness of the work piece is obtained by Rack and Pinion arrangement. In this machine the friction cone mechanism is employed. This consists of three cones one fiber cone and two mild steel cones. They are in such a way that two cones engage at a tune. The fiber cone is held in the main drive shaft and two MS cones are held in main vertical spindle.

In the initial stage the upper MS cone is engaged with fiber cone due to its self weight. As the power supply is given the spindle rotates in the anti clockwise direction. The speed required for tapping is around 100rpm. After the component is being tapped loading is stopped, the label assembly is brought down engaging upper cone with the fiber cone and hence the tap reverses, finishing the operation. If the material is hard the cone slips and breakage of the tap is avoided which is the salient feature of this machine.

3. FORMULATION OF PROBLEM

A tap cuts a thread on the inside surface of a hole, creating a female surface which functions like a nut. During operation, it is necessary with a hand tap to periodically reverse rotation to break the chip formed during the cutting process, thus preventing an effect called "crowding" that may cause breakage. Periodic reversing is usually not practical when power tapping is involved, and thus has led to the development of taps suitable for continuous rotation in the cutting direction. Taps and machine tapping operation for internal threads are amongst the most complex and least understood cutting tools and cutting processes used in practice. Tapping of a screw thread is one of the very common machine operations used in manufacturing industry and is frequently among the last operations performed on a component so that the added value of the component is close to its peak when tapping is performed. But tap breakage may either ruin the almost finished work piece, or create a large down time to remove the broken tap from the work piece. These failures are usually caused by certain process faults that often occur in production. Small, medium and some large scale industries still uses the conventional methods to perform the tapping operation and faces the above mentioned problems. As the industry strives for higher productivity and better quality, this is a need for the tapping process to operate without error or human intervention.

4. DRAWING

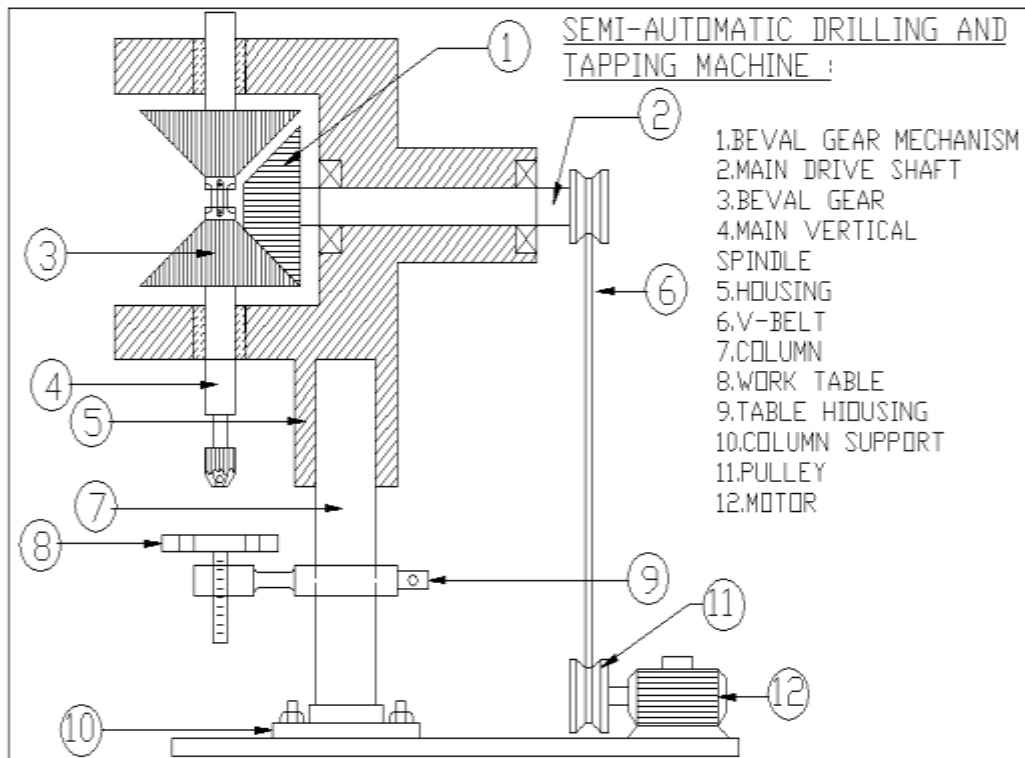


Fig-1 Schematic Diagram Of Tapping Machine

5. TROUBLING SHOOTING

Problems	Probable Cause	Solution
Noisy operation	<ul style="list-style-type: none"> • Dry spindle • Broken bearing • Motor bolts loose • Belts loose 	<ul style="list-style-type: none"> • Remove the spindle and lubricate • Replace the bearing • Tighten the screws • Pull the belts
Excessive wobbling (Eccentric rotation) of the spindle.	<ul style="list-style-type: none"> • Loose spindle. • Worn spindle shaft or bearings. • Broken spindle. 	<ul style="list-style-type: none"> • Tighten the spindle • Replace the shaft or the bearing • Replace the spindle
The motor will not start	<ul style="list-style-type: none"> • Power supply • Motor connection • Connections of the switches • Burnt motor windings • Broken switch 	<ul style="list-style-type: none"> • Check the mains power supply • Check the motor connections • Check the switch connections • Replace the motor • Replace the switch
The tip is jammed in the work piece	<ul style="list-style-type: none"> • Excessive pressure on the feed hand-wheel • Loose tip • Speed is too fast 	<ul style="list-style-type: none"> • Apply less pressure • Tighten the tip • Change the speed

The tip is burning or smoking	<ul style="list-style-type: none"> • Incorrect speed. Revolutions per minute. • Shavings will not discharge • Tip is worn or does not cut the material well • Needs lubrication • Incorrect feeding pressure 	<ul style="list-style-type: none"> • See table speed • Clean the tip • Check the sharpness and taper • Lubricate while drilling • Apply less pressure
The tip vibrates, the hole is not round	<ul style="list-style-type: none"> • The tip was sharpened off centre • Bent tip 	<ul style="list-style-type: none"> • Sharpen the tip correctly • Replace the tip
The temperature of the spindle holder is too high	<ul style="list-style-type: none"> • A) Insufficient lubrication 	<ul style="list-style-type: none"> • Lubricate the spindle holder
The spindle will not stick to the sleeve	<ul style="list-style-type: none"> • Dirt, grease or oil in the morse taper • You are executing an unauthorized operation 	<ul style="list-style-type: none"> • Use detergents (alcohol, etc.) to clean the conical part of the spindle • Milling operations causing the fall

6. CONCLUSION

The tapping operation is normally performed as end operation and very important for fastening purpose. There are so many work carried out by the researchers on tapping operation which includes the quality of tapped hole, accuracy in dimensions, alignment of tapping tool with center of drilled hole, vibration assisted tapping, machine tapping, tapping tool breakages, application of different lubricants and its effect on quality, and parametric study and its analysis.

7. REFERENCE

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