

A Review on Pneumatic Tapping Machine

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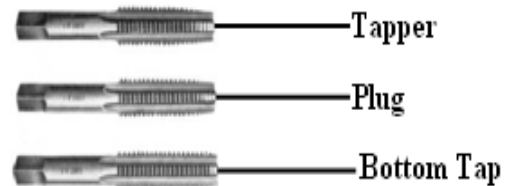
Abstract— Today most of the industries are trying to make improvement in their production processes as well as relevant machinery to improve the productivity along with the automation. Tapping is one such operation which is most frequently used in small and large scale industries. Thread tapping is the method to produce the fine thread inside the drilled hole on the plate. Most of the industries uses the conventional method says hand tapping. This conventional method is very time consuming process, less accurate and includes higher labour cost, and ultimately leads to less productivity. So there is a scope to develop the machine for tapping operation which would overcome all the problems faced by the conventional process. So we are going to develop the pneumatics tapping machine which will make the use of compressed air for it operation without human involvement as which is used in hand tapping.

I. INTRODUCTION

The main objective of our project is to perform tapping operations using "Auto feed mechanism" in tapping machine with the help of pneumatic sources. For a developing industry the operation performed and the parts (or) components produced should have it minimum possible production cost for it to run profitability.

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. 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. Machine tapping can be performed by electric drives and the problems concerned with the machine tapping can be eliminated with the application of pneumatic tapping machine. In industries there are frequent needs for fine internal thread tapping. Huge and complicated designed parts cannot be machined with the help of conventional tapping operation and increasing the area required for them to be accommodated and hence overall initial cost required.

In our project the above complicated problems are minimized.



Conventional Tapping Process

➤ Different types of Tap



Figure 1: Tap Tools

➤ Hand Tapping Procedure

Figure 2: Tapping Process

In Conventional Tapping Process three different types of tools are used for making a single tap. Each of the tap tools is alternately fixed on a tool holder to perform the tapping operation manually.

II. PROBLEM FORMULATION

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

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. Other problems associated with the tapping process include thread dimensional accuracy, thread form error, and surface roughness of thread form. Main problem is caused during the tapping operation of complex and big job in industries. This causes the defect on tap tool and

thread in hole due to difficulty to achieve the proper operation in conventional tapping process.

This causes the more operation lead time, inaccuracy of thread geometry, more production cost, more labour time and cost.

III. LITERATURE REVIEW

Mukesh Shantilal Patel, in 1982, has studied on An Improved Tapping attachment and/ or tap holding device, the principal object of the is innovation is to provide tapping attachment or tool holder with the clutch of the design which act readily thereby eliminating axial thrust right from the machine spindle up to the job, and thereby eliminating not only the tap breakage but also damage to any part of the equipment And further objective of the innovations to provide tapping attachment or tool holder with the clutch of the design which act very smooth and thereby keeps the heat generation during its operation, at a very low level to achieve greater stability to set the spring pressure on clutch and higher functional efficiency[1].

Shigeo Kasai, in 1983, has worked on Tapping Machine, it is the type in which the work piece is automatically positioned, has a releasable connection of the work table and carriage with means for horizontally moving the work table and the means horizontally moving the carriage, so that the work table and carriage may realised for manual operation. The tapping machine also has means for detecting the position of the carriage and means for detecting excessive thrust from the work piece. In addition ,the tapping machine may be provides means for detecting the position of the worktable and controlled devices memory connected with the means for positioning the worktable so that when the worktable manually position, the manual position may be entered and recorded in memory of the control device. The tapping machine may thus be programmed so that multi variety small volume tapping is efficiently performed [2].

Russel Bruerton, in 2013, has worked on, Short Tapping machine, A drilling or tapping machine includes a housing having a front end through which a drill mounting stub projects; a drill shaft having an inner drill tube carrying a splined bush at a rear thereof and carrying the drill mounting stub at a front thereof, a support tube coaxial with the drill tube, having front and rear bearing nuts mounting the support tube on the drill tube for relative rotation; a spline shaft extending from rear to front through the drill tube, and slid ably engaged within the splined bush whereby rotation thereof rotates the drill tube; a moving plate fixed to the rear bearing nut and moveable axially relative to the spline shaft, the moving plate engaging the drill tube to axially move the drill tube relative to the housing; a first drive rotating the spline shaft; and a second drive causing the moving plate to move axially[3].

Prof. P.R. Sawant, Mr. R. A.Barawade, in 2012, has study, 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. In this case study, the SPM used for 8 multi drilling operation (7 of $\text{Ø}6.75$ and $\text{Ø}12$), linear tapping operation of $\text{Ø}12$ and angular tapping operation of $\text{Ø}5.1$ of TATA cylinder

block. In this paper the following studies are carried out 1. Time saved by component handling (loading and unloading), using hydraulic clamping, 2. Increase in productivity both qualitative and quantitative, 3.Less human intervention, indirectly reduction in operator fatigue, 4.Less rejection due to automatic controls [4].

Koichi Asakura, Makoto Demura, Takenori Matsumoto, in 1989, they worked on, Thread cutting with synchronized feed and rotation motors, A machine is provided with a control system in which, according to one aspect, the rotation of the spindle is controlled in the synchronous manner following up the feed amount of the spindle head and the rotation instruction is computed in accordance with the feed deviation, In another aspect, the feed of the spindle head is controlled in the synchronous manner following up the rotation of the spindle and the feed instruction is computed in accordance with the rotation deviation. In a further aspect, the rotation instruction is operated in accordance with the feed speed and the feed acceleration. In still a further aspect, the feed instruction is computed in accordance with the rotation speed and the rotation acceleration. In the preferred embodiments disclosed herein, the synchronism between the rotation of the spindle and the feed of the spindle head can be remarkably improved with various control modes, thus achieving the high speed thread cutting working with high accuracy [5].

Edward G. Rourke, 20705 Cheney Dr., Topanga, Calif. 90290 worked on ,An improved numerically controlled machine tool is provided by resiliently coupling an independent drive mechanism to a tool holder which in turn is fitted to the numerically controlled machine. The drive mechanism in turn is coupled to a working tool used for drilling, tapping, milling or other machine functions. The drive mechanism and the tool holder are resiliently coupled together so that they may be relatively displaced one with respect to each other depending upon the amount of vertical force being through the working tool applied to the drive mechanism tending to urge the drive mechanism either toward or away from the tool holder. The torque, power and/or rate of rotation of the working tool is controlled as a function of the relative displacement of the working tool with respect to the tool holder along a predetermined axis of coupling between them .A longitudinal force exerted on the working tool is a function of a spring constant of the resilient coupling between the drive mechanism and tool holder and their relative displacement. The vertical thrust of the working tool is hence both proportional and limited[6].

IV. PROPOSED RESULT

Due to the various problems faced by conventional tapping processes such as Poor thread finish, more time consumption, frequent tool breakage and many more.

So, we have decided to design the tapping machine which will make use of Pneumatic as a power source.

Bellow is the Future model of tapping machine on which the tapping operation is achieved by Pneumatic system. And it eliminates all the problem faced by conventional tapping process.

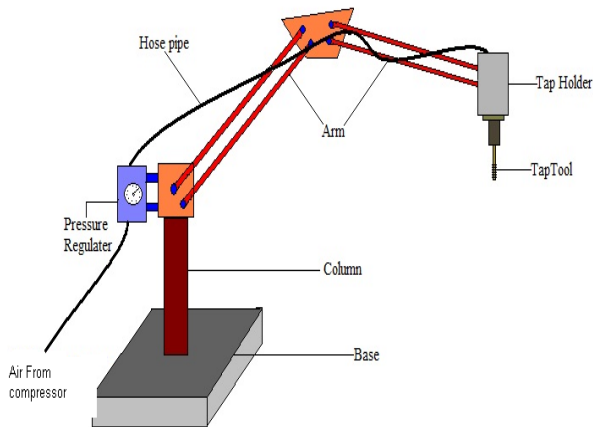


Figure 3: Proposed Pneumatic Tapping Machine

Working:

Pneumatic tapping machine makes use of compressed air as power source, the compressed air is obtained through a compressor. This compressed air passes through air pressure regulator to the pneumatic motor through a hose pipe. This high pressure air exerts an axial spinning force on the rotor located inside the tool head. And causes the tap tool to rotate inside the work piece. The working air pressure is depends on the tap size and product material to be tapped.

V. CONCLUSION

In this paper, we are mainly concerned with the study of tapping operation and have recommended a pneumatic technique for tapping which would overcome the problems faced by conventional method. This new technique will be helpful for better quality of tapped holes, improve the productivity as well as, reduce the time required for the tapping operation. Thus it would be helpful in overcoming the problems faced by the hand tapping process and such a model could be much useful for the small scale industries for mass production.

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- [6] Edward G. Rourke, 20705 Cheney Dr., Topanga,Calif.90290.USO05352069A method and apparatus for a numerically controlled tapping machine