# "DRILLING BY TAILSTOCK MECHANISM OF CONVENTIONAL LATHE MACHINE-REVIEW"

Chandresh P. Rana[1], Harsh N. Gandhi[2],Shwetansu H. Patel[3], Shaunak S.Soni[4]

[1]*Asst. Professor, Mechanical Engineering Department, Vadodara Institute of Engg. Gujarat, India*
[2]*Mechanical Student Mechanical Engineering Department,Vadodara Institute of Engg. Gujarat, India*

## ABSTRACT

Finding a Feasible Design satisfying all constrains by itself a difficult task. Since the world has been gone into the Globalization phase, the old production paradigm of mass production have been disinter rating a new one, based upon more flexible and manufacturing technologies for competitiveness. As we all know that Lathe machine is the oldest machine as compare to the all machines. Because of it is wide variety of operation performance, it is used widely in small scale industry as well as Multinational industry.
Drilling is the most common machining operation and it forms the highest machining cost in many manufacturing activities. Drilling can be done by tailstock mechanism of conventional lathe machine. This research paper has main aim to make a review of that how much work have done in drilling operation using tailstock mechanism.

**Keyword** – *Lathe Machine, Tailstock Mechanism, Drilling Operation*

## 1. INTRODUTION

### 1.1 Lathe Machine working Principle

A Lathe is a machine tool in which the work piece is rotates on its axis to perform various operations such as cutting, sanding, knurling, drilling, or deformation with tools that are applied to the work piece to create an object which is moving reciprocating in parallel and perpendicular directions.

### 1.2 Lathe

Lathe removes undesired material from a rotating work piece in the form of chips with the help of a tool which is traversed across the work and can be fed deep in work. Lathe machine holds the work piece between two rigid and strong supports called centre, or in a chuck or Face plate while the latter revolves. The chuck or the face plate is mounted on the projected end of the machine spindle. The cutting tool is rigidly held and supported in a tool post and is fed against the revolving work. While the work revolves about its own axis the tool is made to move either parallel to or at an inclination with this axis to cut the desired material. In doing so it produces a cylindrical surface, if it is fed parallel to the axis or will produced a Tapered surface if it is fed at an inclination.[1]

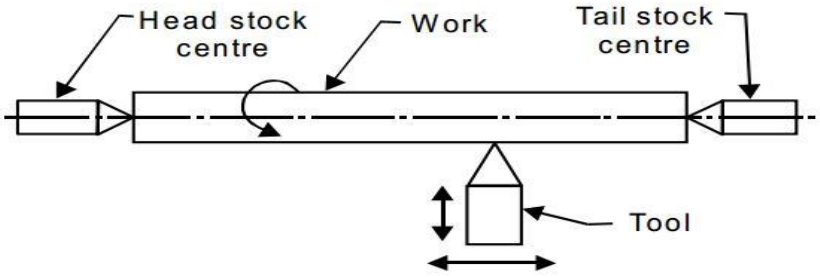


Figure 1: Working Principal of Lathe Machine

### 1.3 Common types of lathes

A. Engine Lathe
B. Bench Lathe
C. Automatic Lathe
D. Capstan and Turret Lathe
E. Tool Room Lathe
F. CNC Lathe
G. Special Purpose Lathe

### 1.4 Different parts of lathe machine

A. Headstock
B. Tailstock
C. Carriage
D. Apron
E. Guide ways & Bed
F. Feed Rod
G. Lead Screw
H. Compound Rest
I. Tool post

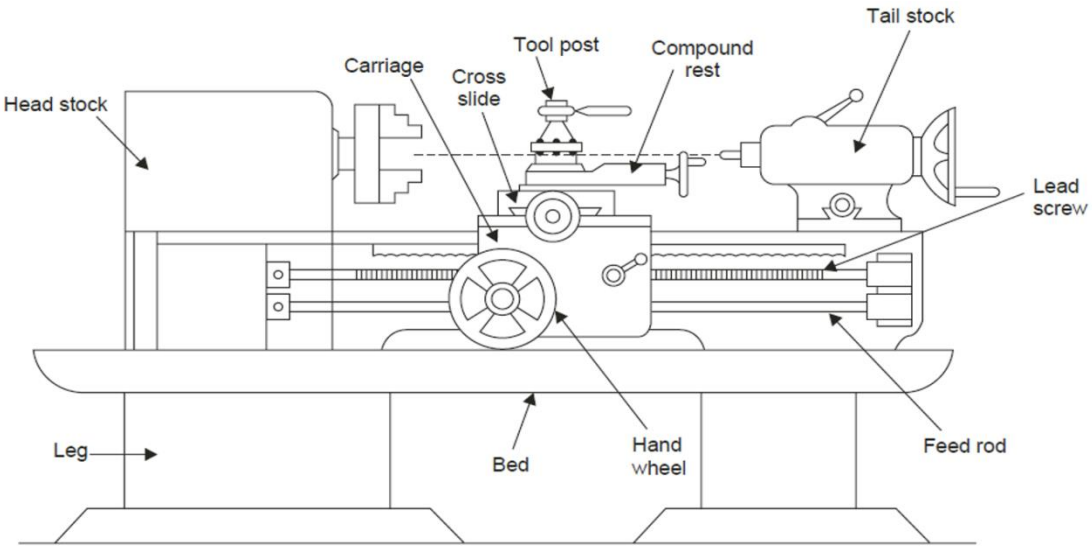


Figure 2: Different Parts of Lathe Machine

### 1.5 Different operation Performed on the lathes:

A. Turning
B. Taper Turning
C. Grooving
D. Facing
E. Cutting off
F. Threading
G. Knurling
H. Boring and internal grooving
I. Drilling

Drilling is the most common machining operation and it forms the highest machining cost in many manufacturing activities. Drilling can be done by tailstock mechanism of conventional lathe machine. This research paper has main aim to make a review of that how much work have done in drilling operation using tailstock mechanism.[2]

**2. LITERATURE SURVEY**

(1)I. BĂDAN, Gh. OANCEA M. VASILON – 2012 [3]

This paper presented the methodology applied to obtain a mathematical model for drilling thrust force. The mathematical model resulted is a power type one, dedicated to 40CrMnMoS8-6 steel and its processing with solid carbide drills. It is dependent on three drilling parameters: cutting depth [mm], cutting speed [m/min] and feed, which is represented, in the mathematical model, by feed rate [mm/min].

(2) Anil JIndal – 2012 [*4*]

He conclude that the experimental results shows that the speed and feed rate are main parameters among the four control factors (diameter, depth of cut, feed rate and spindle speed) that influence the thrust force. Large grit size produces low thrust force in drilling, which can reduce the extent of delaminating. The correlation between thrust force and cutting parameter was obtained by multi-variable regression and compared with the experimental results.

(3) Majid Tolouei-Rad, and Ankit Shah – 2012 [2]

Authors say that properly defined operation sequences and an effective algorithm can minimize the time needed for machining, setting-up and tool changing. It is also concluded that the choice of tooling and cutting conditions depend upon many factors that include workpiece and cutting tool materials, workpiece geometry, etc.

(4) Naseer Ahmed – 2014 [*5*]

In this research paper he concluded that the thrust force increased with increasing the cutting speed and feed. Changing the feed had an approximate linear effect on the thrust forces. But in case of torque, the effect of changing feed rate increased the torque more at higher speeds compared to that at lower speeds.

(5) Puneeth H V, Smitha B S– 2017[*6*]

They investigate that the Cutting forces such as thrust and torque were found out using drill tool dynamometer. The results showed that the maximum thrust force of 126 kgf was developed in Titanium coated HSS compared to TiN coated and uncoated HSS of 47 kgf and of 90 kgf, whereas the torque produced in all the twist drills were at an average of 0.5 Kgm.

(6) Rajendra Singh, Rahul.Gupta, Jitendra Kr. Tripathi – 2014 [*7*]

Researchers conclude that a review of the ANN technique to develop the prediction model for surface roughness has been discussed. In this research study, The experiments were conducted on CNC Lathe using the carbide tool in sert (CCGT-09T30FL), machining variables such as surface finish measured value and vibration in CNC Lathe machining processes.

(7)Mayuresh P Vaishnav,S A Sonawane – 2014 [*8*]

After reading this research paper we concluded that Coolant flow rate is the least significant parameter on surface roughness. Feed is the most significant parameter on surface roughness. The result of present investigation is valid within specified range of process parameters. Also the prediction made by Regression Analysis is in good agreement with Confirmation results.

(8) A.M.Badadhe, S. Y. Bhave, L. G. Navale – 2015[*9*]

This study presents an efficient method for determining the optimal turning operation parameters for surface roughness under varying conditions through the use of the Taguchi parameter design process. The use of the Taguchi parameter design technique was considered successful as an efficient method to optimize machining parameters in a boring operation which will tend to reduce the machining time and enhance the productivity.

(9) SanjeevSharma;RajdeepSingh;Sandeep Jindal – 2015 [*10*]

It is clear from this research paper that the cutting forces are measured by using electricalstrain gauge is the best technique available. As per cutting analysis of forces, it has concluded that the cutting & feed forces is directly proportional to depth of cut & feed rate of tool and inversely proportional to feed/rev.Natural frequency & stress produced in tool of dynamometer has been formulated to give the permissible limits of the safe designs. So the design is safe within given parameters, for which the instrument is made.

(10) GurumukhDas;Padam Das – 2015 [*11*]

Whenever, the cutting force estimation problem in Drilling machine arises, it is possible to give the initial loading to this trained neural network model and it can give a fairly good estimation of corresponding forces torque and axial thrust values. Thus, there is an advantage of not using the machine tool if the torque and axial thrust forces are beyond the limits of the machine tool.

(11) Yogendarsinghchouhan , M. A. Saloda , S. Jindal, Chitranjan Agarwal – 2016[*12]*

They summarized that the result shows that both two parameters have their effect on the measured thrust force. The effect of feed rate is more than spindle speed. As feed rate vary, thrust force value also vary due to change in amount of material removal from work piece by tool. There is less effect of spindle speed on thrust force as the increase in spindle speed leads decrement in thrust force. at 250 rpm of spindle speed which save energy and useful production time during drilling of mild steel work piece.

(12) Mr.Prakash N. Parmar, Prof.Vikas R. Gondalia, Prof.Niraj C. Mehta – 2014[*13*]

It is Clear from this research paper that Innovations such as review on advance automation of conventional lathe machine.by developing automation in conventional lathe machine by retrofitting stepper based method, the machine works as CNC trainer for teaching, learning of the student subject. Also Cost of machine is minimizes approximate 4 times below the original CNC trainer.

(13) Sanal Kumar A.P, Dr.S.Sankar, Dr.K.Senthil Kumar – 2017[*14*]

In this Research, Author was discuss the Modification of Tailstock Design for the Purpose of Trepanning Operation in Heavy Duty Lathe Trepanning process is conducted in a conventional lathe with the help of modified tailstock design. The process was cheaper than any other process and the amount of wastage during making a hole is very less. The core generated during the trepanning operation can be used a raw material for any other machining process.

## 3. CONCLUSION

From the literature review of Drilling operation done by Tailstock Mechanism of Conventional Lathe machine, investigated the following conclusions:

- While doing Operation of Drilling using tailstock mechanism, the forces acting more while performing operation and it will increase with respect to increase in diameter of drill.
- The labour effort required for moving tool linearly into workpiece is higher, and due to this labour efficiency is going to decreased.
- Wearing of tool is more.
- Operation is Ergonomically Uncomfortable. This is directly affect the cost of the work piece.
- In mass production system where the labour cost also affect the cost of the product.

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