A

Seminar report

on

Lathe Machine

Submitted in partial fulfillment of the requirement for the award of degree
Of Mechanical

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Preface

I have made this report file on the topic **Lathe Machine** have tried my best to elucidate all the relevant detail to the topic to be included in the report. While in the beginning I have tried to give a general view about this topic.

My efforts and wholehearted co-corporation of each and everyone has ended on a successful note. I express my sincere gratitude to ……..who assisting me throughout the preparation of this topic. I thank him for providing me the reinforcement, confidence and most importantly the track for the topic whenever I needed it.

Content

Introduction

Lathe is one of the most important machine tools in the metal working industry. A lathe operates on the principle of a rotating work piece and a fixed cutting tool.
The cutting tool is feed into the work piece, which rotates about its own axis, causing the work piece to be formed to the desired shape.
Lathe machine is also known as “the mother/father of the entire tool family”.

HISTORY

The lathe machine is one of the oldest and most important machine tools. As early as 1569, wood lathes were in use in France. The lathe machine was adapted to metal cutting in England during the Industrial Revolution.
Lathe machine also called “Engine Lathe” because the first type of lathe was driven by a steam engine.

USES

Wood Lathing

- The most traditional use for a lathe is in the field of woodworking. A lathe can be used to shape raw wooden posts into ornate columns, railing supports and table legs. An artisan will use a specialized set of knives and gouging tools to shape the wood as it rotates at high speeds on its axis.
- There is a danger associated with wood lathing in that choosing a piece of wood with a hidden knot can sometimes knock the piece of wood loose from the lathe or the knife from the hand of the woodworker. Choosing a quality piece of wood for lathing is therefore a prime safety concern.

Metal Lathing

- Metal lathing has been a key element of the industrial revolution because a lathe is needed for creating the common screw, a fastener without which other high technology might not exist.
- The lathing of metal isn't limited to screw making though; another common use of the metal lathe is in making pots and pans. Aluminum is a particularity ideal materiel for lathe shaping items such as pots, as it is relatively malleable, compared to steel and far less expensive than copper. Metal lathes also are used in a plethora of other automated production scenarios.

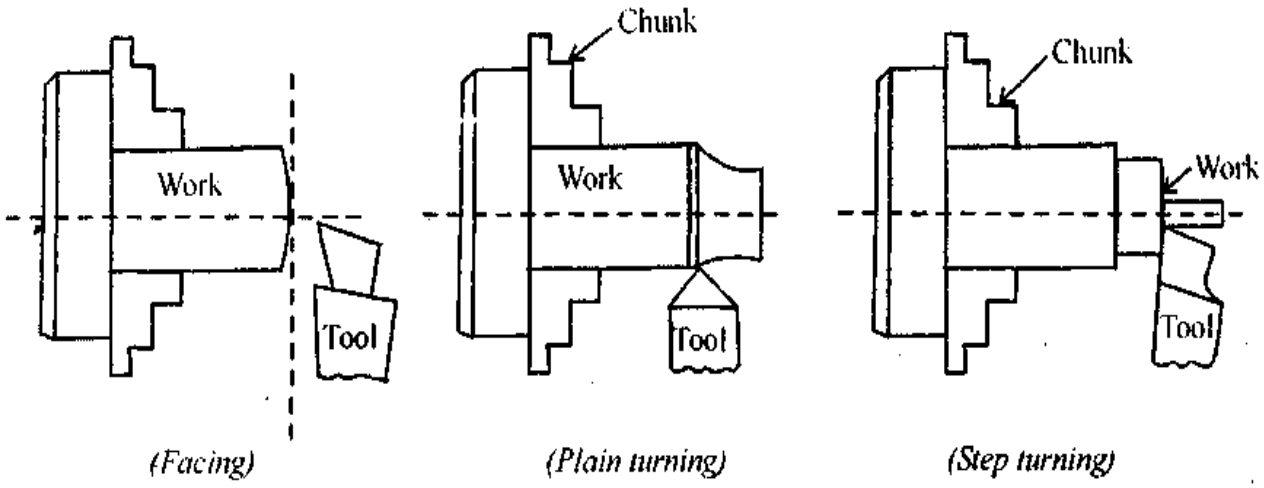
Acrylic Lathing

- Acrylic ingots can be shaped with a lathe into a variety of useful items, the most common of which are the grips on budget-model hand tools. Acrylic lathing is also used to shape trophies and awards.
- Often times a piece of clear acrylic, or even occasionally other plastics, is cast to contain a metal figure in the center having something to do with the award in question, then spun on a lathe and changed from its cubic shape into a rough sphere. The rough sphere then is polished to make a typical globe trophy.

Operations of Lathe Machine

(i) Facing: This operation is almost essential for all works. In this operation, as shown in fig., the work piece is held in the chuck and the facing tool is fed from the center of the work piece towards the outer surface or from the outer surface to the center, with the help of a cross-slide.

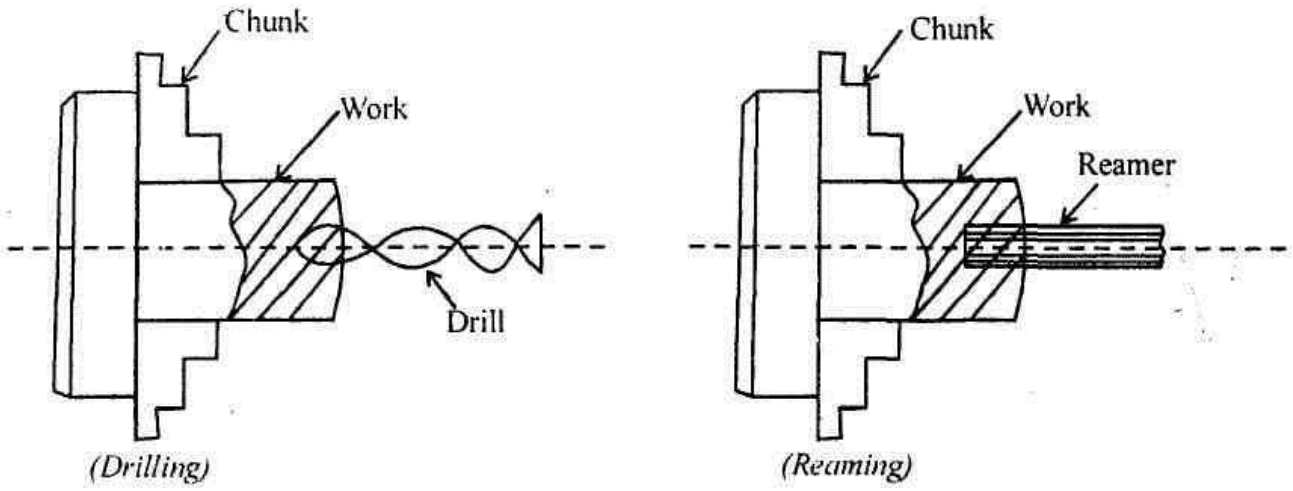
(ii) Plane Turning: **It** is an operation of removing excess amount of material from the surface the surface of the cylinder work piece. In this operation, shown in fig., the work is held either in the chuck or between centers & the longitudinal feed is given to the tool either by hand or power.



(Facing) *(Plain turning)* *(Step turning)*

(iii) Step Turning: It is an operation of producing various steps of different diameters of in the work piece as shown in fig. This operation is carried out in the similar way as plain turning.

(iv) Drilling : It is an operation of making a hole in a work piece with the help of a drill. In this case as shown in fig., the work piece, by rotating the tail stock hand wheel. The drill is fed normally, into the rotating work piece, by rotating the tail stock hand wheel.



(v) **Reaming** : It is an operation of finishing the previously drilled hole. In the operation as shown in fig., a reamer is held in the tailstock and it is fed into the hole in the similar way as for drilling.

Components

The Headstock Component

The upper end of the spindle is held in place and anchored by the headstock on the lathe machine. It also houses the motor that rotates the wood. The way in which you adjust the speed of the spindle is to use a number of pulleys you can find in the back of the headstock. The wood piece stays in place even while the spindle spins due to a chuck or high-tension spring that steadies it.

The Tailstock unit

A lathe machine is a centered mechanism that is attached to the piece of wood, and that is held in place by a tailstock. The center can turn with the wood or stay in one place. Within the rotating device or live center are bearings that permit movement.

Cutting tools (gauge and chisel), finishing tools and spear

Depending on your project and the cutting tool needed, you can choose from different attachments to your lathe machine. For removing the extra wood we use gauge tool. A skew chisel is utilized to create more intricate carved features. Finer details are made using round chisels and narrower spears. The wood finishing tools have round edges in order to protect wood from slicing.

Carriage Component

The lathe's cutting tool is steadied by the carriage, giving the craftsmen the freedom to do his work. The carriage consists of five different components, which include the compound rest, cross-slide, apron, tool rest and saddle. These components function in conjunction to allow the cutting tool to be used to slide into place.

Spindle mechanism

There is a trio of configurations for lathe spindles. The threaded, tapered and cam-lock configurations are the three that mainly concern us here. Attaching the chuck to a threaded model is complex, as the threaded model's configuration is old and the model doesn't have taper Cam-lock spindles slides into a ring of similar holes and contain cam studs on one end. When you turn the chuck key, the studs will be locked into place. The third configuration, the tapered spindle, narrows at the tip and has a threaded collar with a built-in chuck key.

Advantages

Accuracy

- The CNC machine was invented by John T. Parsons in the late-1950s and revolutionized the manufacturing industry by creating parts with pinpoint accuracy. Because the cutting tools are controlled by a computer, you can within .0001 inches as long as your tooling is sharp and the conditions of the spinning material on the lathe are set to optimize the cutting process. A CNC lathe can cut many parts before the tooling will need to be change and each one will be identical.
- The only possible errors are related to human interaction. If the program is off or the tooling is set improperly, damage and inaccuracies can occur. The machine will only do what it is told through the control unit, so if the material is not properly set up by a human, the CNC control will not be aware of that fact.

Speed

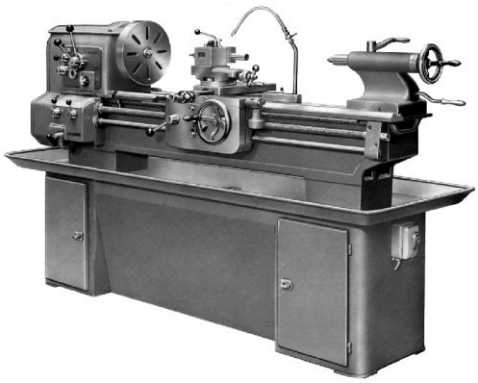
- CNC lathes are not only accurate but can be run very fast. This leads to increased efficiency and more parts per hour. Humans have limited feed rate ability on manual lathes. Because CNC lathes often have 12 or more tools in a turret, they can change to another tool rather quickly.
- Most manual lathes have one tool that can be used at a time, severely limiting the speed of the machining process if more than one tool is necessary to complete the part. The CNC lathe can also change tools in a fraction of a second and can feed into the parts fast thanks to power motors seen on modern CNC lathes.

Cost Effectiveness

- Although CNC lathes can cost hundreds of thousands of dollars, their overall speed and accuracy make them a very cost effective choice, as many operations can take place within them. Whereas you may need two or three manual lathes and a manual mill to get a part done, you can do all of those operations and more in a well-equipped CNC lathe. This leads to a substantial savings on cost per part over manual machines.
- Also, the accuracy contributes to less waste through human error. Your labor costs may seem higher due to the high cost of trained CNC lathe programmers and machinists, but if you break it down by part, it could be substantially lower.

Types of Lathes

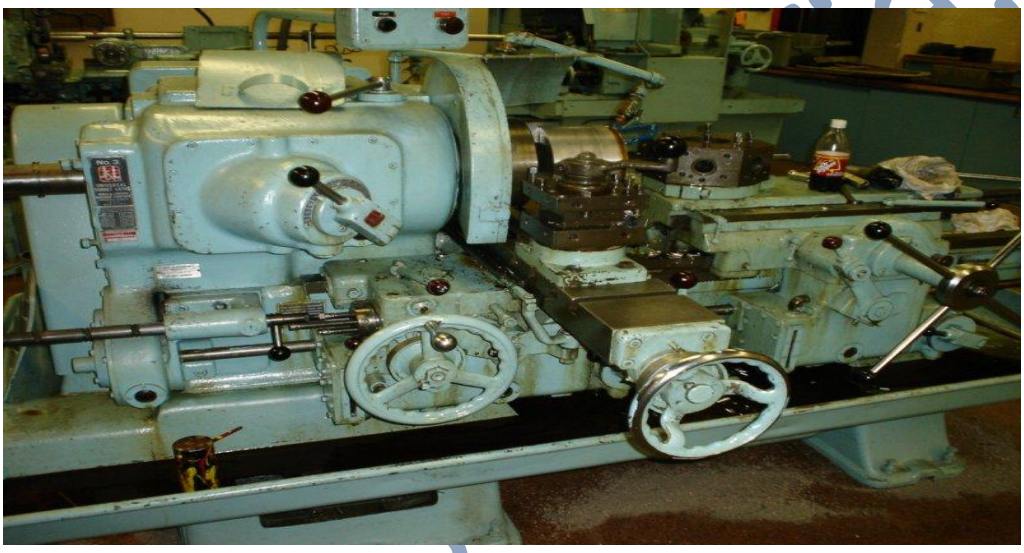
- **Engine lathe**
    - Not production lathe, found in school shops, toolrooms, and job shops
    - Primarily for single piece or short runs
    - Manually operated



Special Types of Lathes

Turret lathe

- Used when many duplicate parts required
- Equipped with multisided toolpost (turret) to which several different cutting tools mounted
    - Employed in given sequence



- **Single- and multiple-spindle automatic lathes**

- Six or eight different operations may be performed on many parts at the same time
- Will produce parts for as long as required

- **Tracer lathes**
  - Used where a few duplicate parts required
  - Hydraulically operated cross-slide controlled by stylus bearing against round or flat template
- **Conventional/programmable lathe**
  - Operated as standard lathe or programmable lathe to automatically repeat machining operations
  - 2-axis (DRO) so can see exact location of cutting tool and workpiece in X and Z axes
- **Computerized numerically controlled lathes**
  - Cutting-tool movements controlled by computer-controlled program to perform sequence of operations automatically

Conclusion

Computerized Numerical Control (CNC) machining technology is a mouthful, but it is also fascinating by using computers to create metal parts and products for equipment and machines. In more simple terms, it is high-tech machining technology. Machining and metalworking have been developed with computer technology.

More efficiency output operations with even greater precision resulted from this marriage of machining and computers. In this technology, the hydraulic system is extensively used to control the process and drive the machines. So, most of conventional lathe machine are currently converted to CNC lathe machine. The hydraulic circuit is very important for controlling the hydraulic system and describes the functional structure of the hydraulic system.

References

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