

Machine and Engine Lathes
Unit 2
Page 1

- *One of the oldest tools but is still widely used.**
- *Born out of the foot operated wood lathes of the thirteenth century.**
- *Main use is to make cylindrical shapes.**

I. Types of Lathes

A. Engine Lathe Types

1. Bench Lathe

- a. small and used for light machining**
- b. usually mounted on a bench or cabinet**

2. Speed Lathe

- a. setup and tear down of work pieces is extremely fast.**
- b. small and usually mounted on a bench**
- c. used for light machine work, turning, polishing, and precision work**

3. Toolroom Lathe

- a. high precision lathe used for making tools and gages**
- b. high precision lathe**

4. Gap-Bed Lathe

- a. the bed of the lathe can be removed to allow for large diameter turning**

B. Manufacturing Lathes

- 1. used for multiple parts**
- 2. lathe is equipped with a tracer that can reproduce parts faster than a human.**

C. Production Lathes

- 1. large number of parts**
- 2. can be computer controlled (CNC)**
- 3. can hold up to twenty different tools that can perform a variety of turning, drilling, and boring operations**

Machine and Engine Lathes

Unit 2

Page 2

II. Size of the Engine Lathe

***determined by the maximum diameter of the work that can be turned**

***determined by the maximum length of the work that can be turned**

***most common size is 9" to 30" swing (diameter) and 16" to 12' length between the centers**

III. Lathe Parts

A. Bed

- 1. heavy cast piece that runs the length of the lathe**
- 2. all tools and the carriage are mounted to this**

B. Headstock

- 1. clamped on the left hand side of the bed**
- 2. houses the gears and upper pulley**
- 3. feed levers are placed on the front of this**
- 4. feed and speed charts are placed on the outside**
- 5. holds the headstock spindle which the chuck is mounted onto**

C. Quick-Change Gear Box

- 1. Contains various sizes of gears that are used for changing the speed of the lead screw. This is used for thread cutting.**

D. Carriage

- 1. Supports the cutting tools and moves along the bed.**
- 2. Consists of three main parts**
 - a. Saddle-mounted on top of the ways and holds the cross slide**
 - b. Compound Rest-holds the cutting tool**
 - c. Apron-houses the mechanism for the automatic feed.**

Machine and Engine Lathes

Unit 2

Page 3

E. Tailstock

- 1. Housed on the right end of the lathe**
- 2. Slides side to side of the ways of the bed.**
- 3. Consists of the following parts**
 - a. clamp lever-tightened the tailstock to the bed**
 - b. tailstock spindle-has a 60 degree bearing surface to steady spindle turnings, can also hold drill chucks**
 - c. Spindle-Binding Lever-locks the spindle in place for turning**
 - d. Tailstock Handwheel-Allows the spindle to be turned in or out when the binding lever is not tightened**

IV. Safety Precautions

- *Always wear glasses.**
- *Know all of the operations.**
- *No loose clothing or jewelry**
- *Stop the lathe before taking any measurements.**
- *Use a brush to remove chips.**
- *Never change tool bits while the lathe is running.**
- *Do not take heavy cuts on small pieces.**
- *Do not lean on the machine.**
- *Do not place tools on the headstock.**
- *Keep oil and grease off of the floor.**

V. Feed and Speed

A. Cutting speed

- 1. The rate the work piece passes the cutting tool.**
- 2. Varies for each type of metal.**
- 3. Varies for the size of the metal.**

B. Lathe Feed

- 1. How fast the cutting tool is fed into the work.**
- 2. Varies for each type of metal.**
- 3. Varies for the finish of the work piece.**

Machine and Engine Lathes

Unit 2

Page 4

C. Turnings

1. Rough Turning

- a. removes excess metal quickly
- b. usually .010 to .015 per pass with a sharp tool
- c. slow lathe speed and slow feed rate

2. Finish Turning

- a. removes the final amount of metal
- b. usually .008 to .005 per pass
- c. fast lathe speed and slow feed rate

VI. Various Lathe Operations

A. Filing

1. done with a normal hand file. (must have a handle on the tang)
2. done to remove machine marks.
3. Use long strokes that file away from the chuck.

B. Polishing

1. done to achieve a mirror like finish.
2. Lathe is set at a high speed.
3. Roll up all loose clothing.
4. Use emery paper, starting with coarse and ending with fine.

C. Knurling

1. diamond shaped pattern on metal used from decoration and for gripping.
2. Knurling heads are extremely hard and expensive.
3. Feed on the quick-change gearbox for .010.
4. Speed should be 200-300 RPM.
5. The knurling head should be forced into the work piece about .025.

Machine and Engine Lathes

Unit 2

Page 5

D. Tapers

- 1. Used for machining applications.**
- 2. Tailstock is offset.**
- 3. You must know the length needed and the major diameter and the minor diameter.**

E. Drilling

- 1. Drill chuck is placed in the tailstock.**
- 2. The work piece spins in the lathe chuck and the drill bit is feed into the work.**
- 3. Lathe speed should be very slow**
- 4. Oil is usually applied to the bit.**

F. Boring

- 1. same as drilling except a specialize tool is used**
- 2. boring is the process of enlarging and truing a drilled hole.**

G. Reaming

- 1. same as boring except the finish of the hole needs to be extremely exact and to a high degree of finish.**
- 2. A reamed hole is drilled to just undersize of what the finished hole needs to be.**

H. Tapping

- 1. the process of placing machine or screw threads inside a finished hole.**
- 2. The hole is always drilled undersize.**
- 3. The lathe chuck is locked up and the tap is fed into the hole with the aid of a ball bearing center.**
- 4. This is done with the lathe off.**
- 5. 3/8-16 thread would have a 5/16 hole.**

Machine and Engine Lathes

Unit 2

Page 6

I. Thread cutting

- 1. Can be done automatically with the split nut and the automatic feed.**
- 2. Can be done manually with a die.**
 - a. lathe head is locked in place.**
 - b. Tailstock is used to flatten the die against the work piece.**
 - c. The die is turned with a crescent wrench**
 - d. Usually done for smaller diameter threads.**
- 3. The work piece is turned down to the diameter needed**
- 4. 3/8-16 thread, the work piece would be turned done to 3/8” or .375**