

**Ministry of high Education and Scientific Research
Middle Technical University
Electrical Engineering Technical College**

**Training package
in
Workshops
(Mechanical tools and devices)**

For
Students of first class
Department of Medical Instrumentation Techniques Engineering



By

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**Mechanical tools and
devices**



25th & 26th

**25th & 26th
modular
units**

1/ Overview

1 / A –Target population :-

For students of first class

Department of Medical Instrumentation Eng. Techniques

1 / B –Rationale :-

This unit introduces principles of mechanical tools and devices in the workshop

1 / C –Central Idea :-

The major topics discussed in this unit are included in the following outline.

- **Vice machine**
- **Drill machine**
- **Lathe Machine**

2/ Performance Objectives :-

After studying the first modular unit, the student will be able to-

1. Used the mechanical tools and devices

3/ Pre test :-

Circle the correct answer:-

1. It is used to hold pipes, shaft or round jobs.

- a- Bench vice
- b- Pin vice
- c- Pipe vice
- d- all above

2. These types of drilling machine used to drill small holes at high speed in lighter jobs or work pieces.

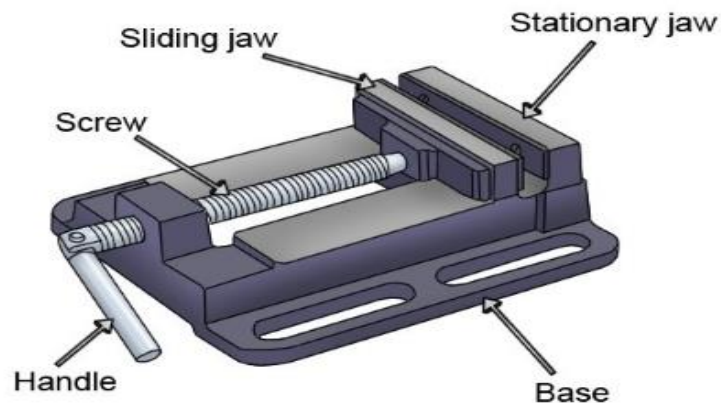
- a- Manual
- b- sensitive drilling machine
- c- Circuit breaker
- d- All above

4/ the text :-

➤ Mechanical tools and device

I. Vice Machine

A machine vice usually has hardened jaws which allow it to withstand the large amount of force that comes with machining applications.

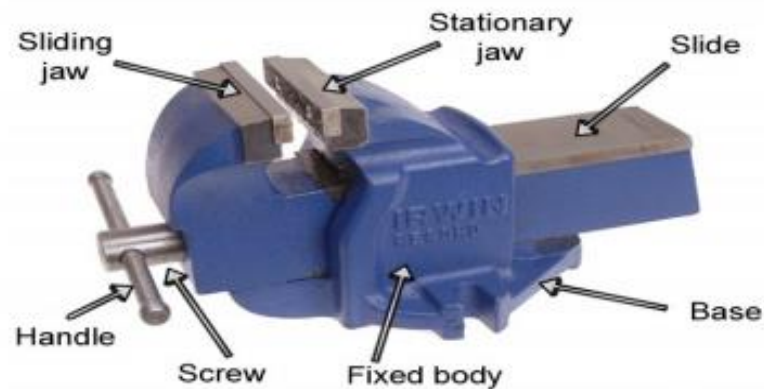


➤ Types of Vice Machine

1- Bench vice

It is firmly fixed bench with the help of nut and bolt. It consists of a cast iron body and cast iron jaws. Two jaw plates are fitted on both the jaws. The holding surface of the jaw plates is knuckled in order to increase the gripping. Jaw plates are made up of carbon steel and wear resistant. One jaw is fixed to the body and the second slides on a square threaded screw with the help of a handle. The jaws are opened up to required length job is placed in the two jaws and

is fully tightened with the help of handle. Handle is used to move the movable jaw.



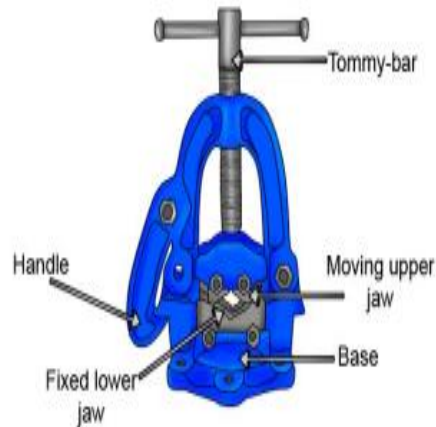
2- Pin vice

Design of hand vice of drilling machine. It is used to hold wire or small diameter rods.



3- Pipe vice

It is used to hold pipes, shaft or round jobs. It works on the same principles as the bench vice. It consists of a vertical screw with square to move the movable jaw, which is fixed on the lower end of the screw.



II. Drilling Machine

The drilling machine is defined as a machine which is used to make a circular hole, a tool used to drill the holes of different size and other related operations using a drill bit.

➤ Parts of Drilling Machine:

- 1 -Base
- 2 -Column
- 3 -Table
- 4 -Radial Arm
- 5 -Drill head
- 6- Spindle speed and Feed mechanism.

➤ Types of Drilling Machine

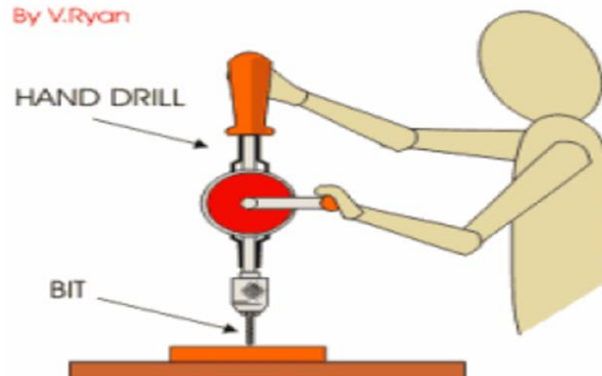
1- Manual

Hand Drill



HOW TO USE A HAND DRILL

By V.Ryan



2- Electrical Drilling Machine and its Types

a. portable drilling machine

These types of a drilling machine are commonly used in all the workshops. Used to drill small sized holes. It is operated by holding in a hand.

Pistol-grip (corded) drill



- A drill in the shape of a pistol.
- Commonly called electric hand drill.



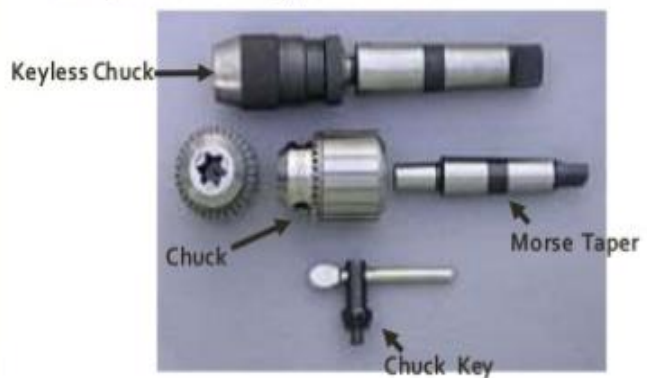
Cordless drills



- A cordless drill is a type of electric drill which uses rechargeable batteries.

Tool Holding

- Drills and similar tools with parallel shanks are held in a drill chuck.
- By rotating the outer sleeve, the jaws can be opened and closed.
- To ensure maximum grip, the chuck should be tightened using the correct size of chuck key. This prevents the drill from spinning during use and chewing up the drill shank.



b. sensitive drilling machine

These types of drilling machine used to drill small holes at high speed in lighter jobs or work pieces. The machine may be mounted on the bench or floor and the drilling work is started with the drill fed into the work piece by purely hand control.



c. Upright drilling machine

It is larger in size and stronger than sensitive drilling machine. It is used for drilling medium and large-sized holes.



d- Automatic drilling machine

These types of drilling machine can perform a series of machining operations successive units and transfer the work from one unit to the other automatically.



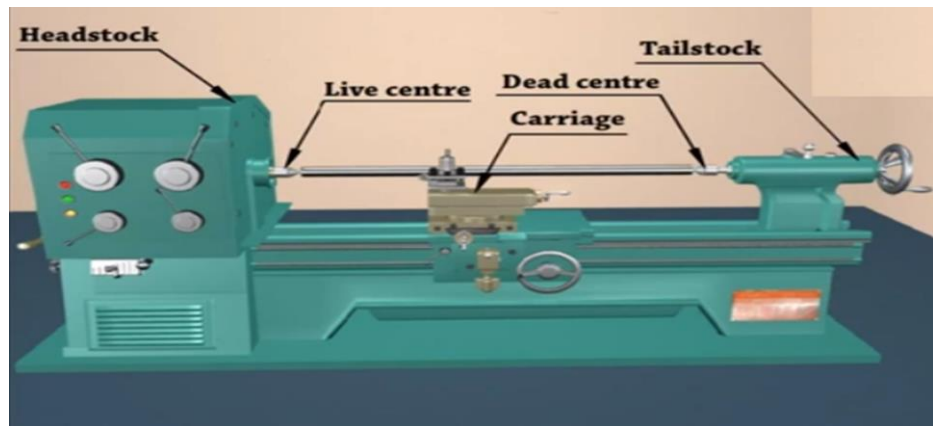
III. Lathe Machine

Lathe machine is known as the mother of machine tools.

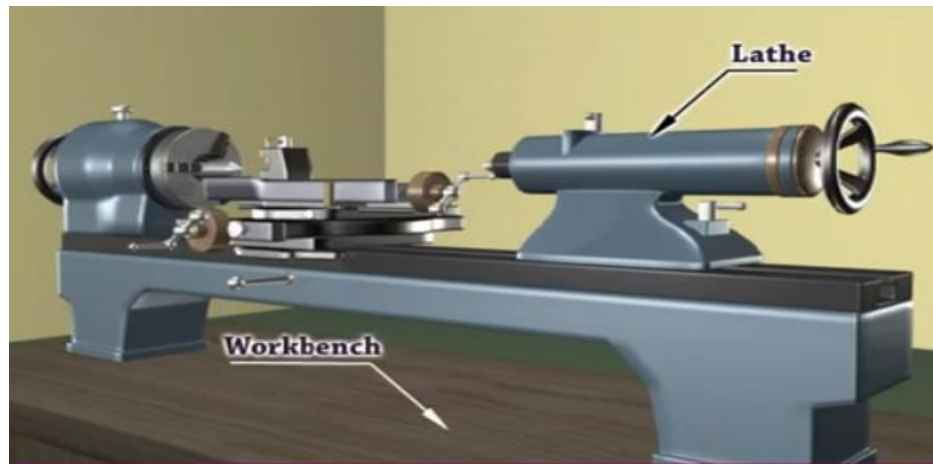
Lathe machine is used to give shape to the wood or iron bars that are forced against a tool. It is used to remove metal from a work piece to give a specific shape and sizes. Lathe machine is extensively used in metal working, metal spinning, woodturning, and glass working.

Types of lathe machine

1- Engine Lathe

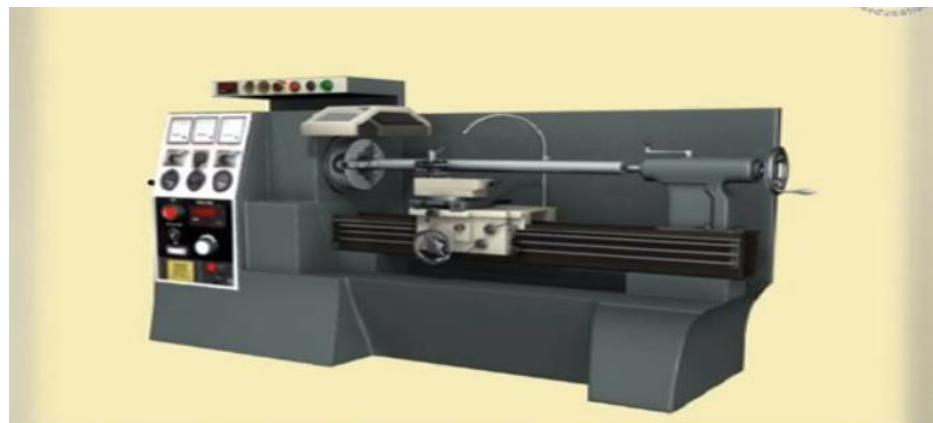


2- Bench Lathe



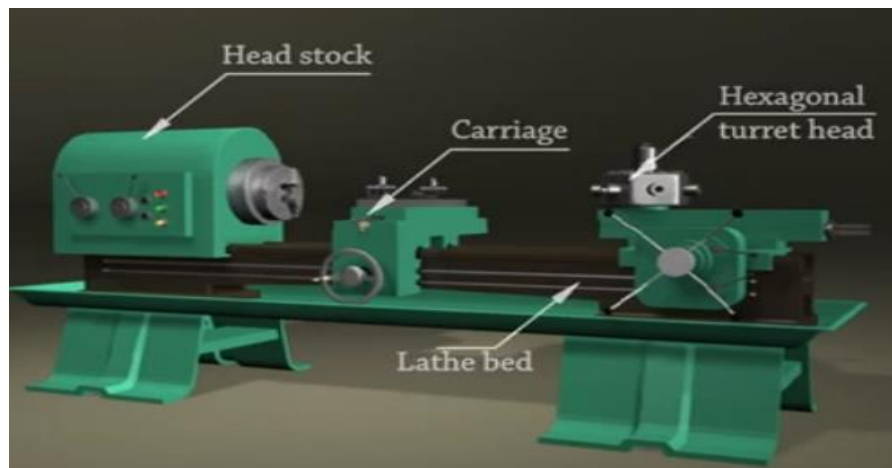
It is a small lathe that can be mounted on a workbench.

3- Tool Room Lathe



It is meant for application of tool making which require accurate and precision machining.

4- Turret Lathe (Semi- Automatic)



5- Automatic Lathe (CNC)



5/ Post test :-

Circle the correct answer:-

1- Known as the mother of machine tools.

- a- Lathe Machine
- b- drilling machine
- c- Vice machine
- d- all above

2- A machine that is used to make a circular hole, a tool used to drill the holes of different size

- a- Lathe Machine
- b- drilling machine
- c- Vice machine
- d- all above

6/ key answer :-

1- Pre test :-

1. c
2. b

2- Post test :-

1. a
2. b

7/References :-

1. Encyclopedia of Electronic Components Volume 1 (Charles Platt).
2. <https://www.electricaltechnology.org/2013/03/how-to-remember-direction-of-pnp-and.html>