

ENGINEERING WORKSHOP LAB PORTFOLIO

Course ID: ME - 1102

Department: Mechatronics Department – College of Engineering

Lab Objectives:

1. To give basic introduction to general engineering workshop practices.
2. To provide general safety procedures and use of Personal Protective equipment.
3. To produce a part illustrated in a drawing using lathe, milling, shaper and drill machine etc.
4. To practice electric arc welding and provide basic knowledge of house hold wiring.
5. Design/Develop solutions for complex engineering problems relating to workshop technology.

Lab Facilities:

- 1) Mechanical Workshop Labs gives an opportunity to students to learn the wood working, metal working, machining, welding and modern tool working trades that are essential in engineering field.
- 2) Workshop teaches the student the work ethics, team work, patience and professional attitude towards his/her work, it also helps the student in gaining the knowledge related to the machines and tools that are being currently used in our industry.
- 3) It is purely concerned for our management to provide fully equipped safety requirements to each and every student working in this lab.

PROVISION OF WORK IN THE WORKSHOP LAB

Wood Working

- Basic wood measuring and cutting
- Various Wooden joints
- Filing

Metal Working

- Basic cutting and slotting
- Internal and External Threading
- Filing

Machining

- Developments of slots on Metal bars with Shaper Machine.
- Facing, drilling, threading and cutting with Lathe Machine.
- Milling Machine for slotting

Welding

- Introduction to Arc Welding
- Welding of Butt Joints

Electrical House hold Wiring

- Introduction to 3 phase Motor connection
- LED and Fan switching connection

BASIC WOOD WORKING AND METAL WORKING TOOLS

Classification of Tools:

01 Layout tools or Marking Tools:

Micrometer, venire Caliper. Scriber, divider, Angle protector, thread gauge, Rules, Radius Gauge, Filler gauge, surface plate, Tri square

02 Cuttings tools:

Saws with classifications, Chisels (hot & Cold), knife, Snips, Grinders.

03 Finishing Tools:

File& classification of files, sand paper, Grinder, planers.

04 Holding Tools.

Vise & classification of vises, C clamps, pliers, jigs & fixtures.

05 Striking Tools

Hammer & Classification of Hammers.

06 Assembling Tools:

Screw driver & classification of screw drivers, spanners, wrenches.

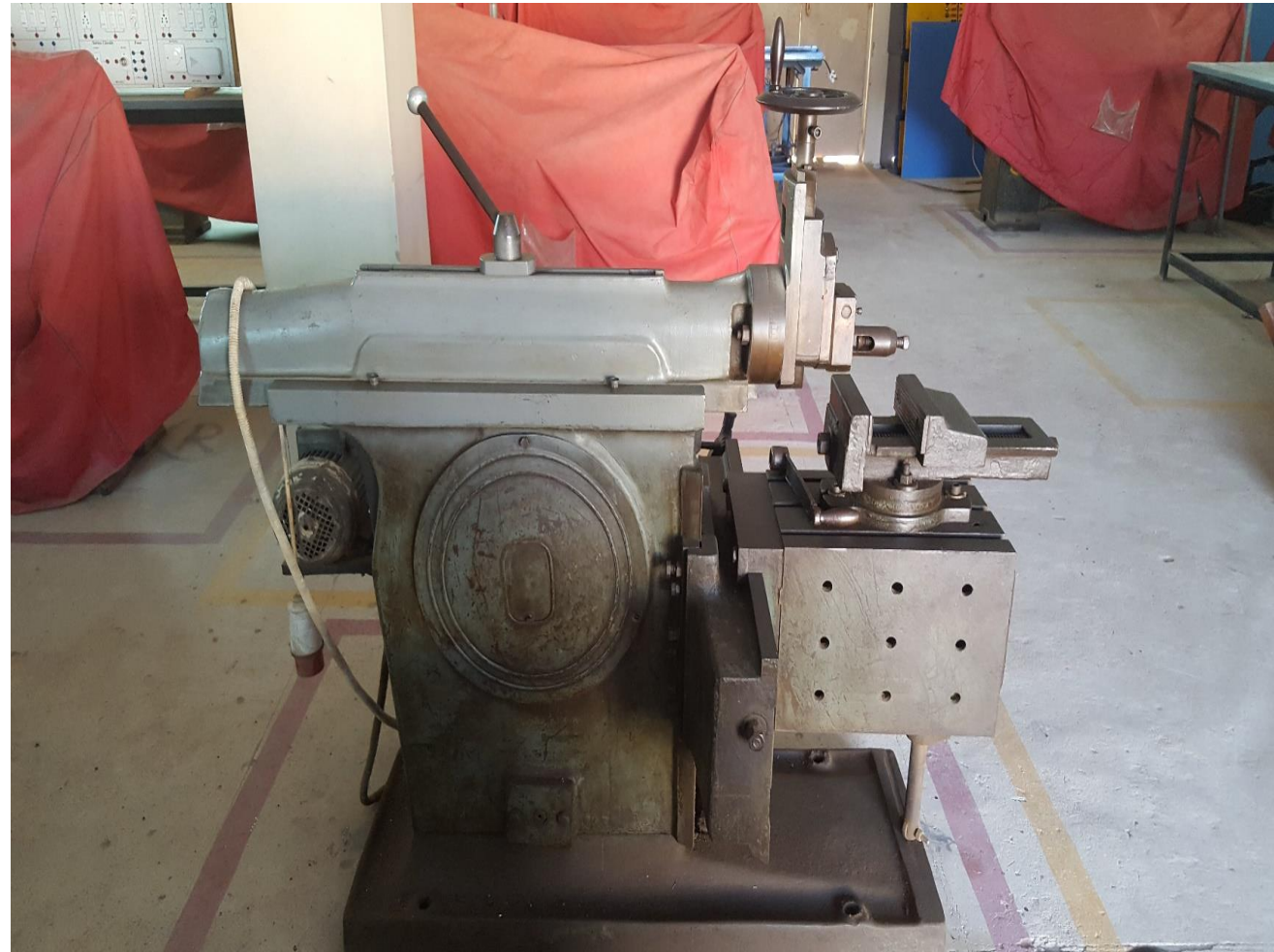


PUSH BACK MECHANISM - SHAPER MACHINE

Introduction: The shaper is a machine tool used primarily for:

1. Producing a flat or plane surface which may be in a horizontal, a vertical or an angular plane.
2. Making slots, grooves and keyways
3. Producing contour of concave/convex or a combination of these

Working Principle: The job is rigidly fixed on the machine table. The single point cutting tool held properly in the tool post is mounted on a reciprocating ram. The reciprocating motion of the ram is obtained by a quick return motion mechanism. As the ram reciprocates, the tool cuts the material during its forward stroke. During return, there is no cutting action and this stroke is called the idle stroke. The forward and return strokes constitute one operating cycle of the shaper.



CONVENTIONAL LATHE MACHINE

Lathes are very versatile. They are usually used to machine (turn) round (cylindrical) parts, but can also produce many unique and irregular shapes. A lathe can drill, ream, turn, knurl, cut and shape cylindrical parts. The type of machine in the Mechanical Engineering Machine Shop is a manual lathe, also known as a tool room lathe. Normally, a part is held in a collet or lathe chuck and a cutting tool is held in a tool post. The lathe is switched on and the part begins to rotate. The cutting tool is then brought to the rotating part and removes material. Various operations lathe can perform following

- Facing
- Contour turning
- Form turning
- Taper turning
- Chamfer
- Cutoff or Parting
- Boring
- Knurling
- Drilling



VERTICAL MANUAL MILLING MACHINE

Milling is the process of machining flat, curved, or irregular surfaces by feeding the work piece against a rotating cutter containing a number of cutting edges. The usual Mill consists basically of a motor driven spindle, which mounts and revolves the milling cutter, and a reciprocating adjustable worktable, which mounts and feeds the work piece.

Milling machines are basically classified as vertical or horizontal. These machines are also classified as knee-type, ram-type, manufacturing or bed type, and planer-type. Most milling machines have self-contained electric drive motors, coolant systems, variable spindle speeds, and power-operated table feeds

Milling Operations

Milling operations may be classified under four general headings as follows:

Face milling. Machining flat surfaces which are at right angles to the axis of the cutter.

Plain or slab milling. Machining flat surfaces which are parallel to the axis of the cutter.

Angular milling. Machining flat surfaces which are at an inclination to the axis of the cutter.

Form milling. Machining surfaces having an irregular outline.



DRILLING TOOLS

Introduction: The drilling machine or drill press is one of the most common and useful machine employed in industry for producing forming and finishing holes in a workpiece. The unit essentially consists of:

1. A spindle which turns the tool (called drill) which can be advanced in the workpiece either automatically or by hand.
2. A work table which holds the workpiece rigidly in position.

Working principle: The rotating edge of the drill exerts a large force on the workpiece and the hole is generated. The removal of metal in a drilling operation is by shearing and extrusion.

1. Portable drilling machine: It is a small light weight, compact and self contained unit that can drill holes upto 12.5 mm diameter. The machine is driven by a small electric motor operating at high speed
2. Sensitive drill machine/press: This is a light weight, high speed machine designed for drilling small holes in light jobs. Generally the machine has the capacity to rotate drills of 1.5 to 15.5 mm at high speed of 20,000 rev/min.



ELECTRICAL ARC WELDING

An electric arc is produced when two current carrying conductors are brought together and then separated by small distance provided there is sufficient voltage available to force a flow of current through the air gap. The arc produced is associated with a bright glow and intense heat throughout its length and may have a temperature of the order of about 5000oC to 5500oC.

An arc between a consumable filler metal electrode and the work piece is extensively used in many of the welding processes today. When the arc is of the intense heat produced, quickly melts the work piece metal under the arc and produces a molten metal. Simultaneously the end of the electrode melts and the molten metal is carried by the arc into the metal pool on the work piece to provide a filler to the joint. A proper arc length is important for sustaining the arc and producing a good weld. The processes which use an arc produced between a consumable electrode and the work piece include metal arc welding.



ELECTRICAL HOUSE HOLD WIRING

The Residential Electrical Wiring trainer is used to provide an introduction to electrical wiring techniques. The knowledge and skills from these activities will enable to identify and demonstrate proper wiring of common electrical fixtures as well as the skills to wire some of the most common electrical circuit. The components of wiring to be discussed are:

1. Neutral wiring
2. Three phase distribution and short circuit protection in the **main panel**.
3. Typical room circuit



SAFETY EQUIPMENTS

Personal Safety

- Qualified or suitably trained personnel only to use equipment
- Wear suitable attire for operating machinery or equipment
- Keep equipment and the surrounding area clean and tidy at all times
- Always seek instruction before using an unfamiliar piece of equipment
- Only use tools and machines for their intended purpose
- Report any damaged equipment and do not use it until it has been repaired by a qualified person
- Where machine guards are provided they must be kept in place
- Never distract the attention of another staff member when operating equipment and never indulge in horseplay
- Always use the appropriate personal protective equipment
- Long hair must be restrained
- Never use compressed air for cleaning clothing and machinery
- Report ALL hazards, unsafe conditions and work practices.



Cut Resistant Gloves



Eye Protection Goggles



Field Shoes with Metal Toe



Fire Extinguisher



Surgical Masks



Lab Working Coats