

The Powerhouse of Workshop: Drilling Machines



What is a Drilling Machine?

Definition: A power-driven machine that creates precise cylindrical holes in various materials

Function: Rotates a drill bit at high speeds to cut through the material

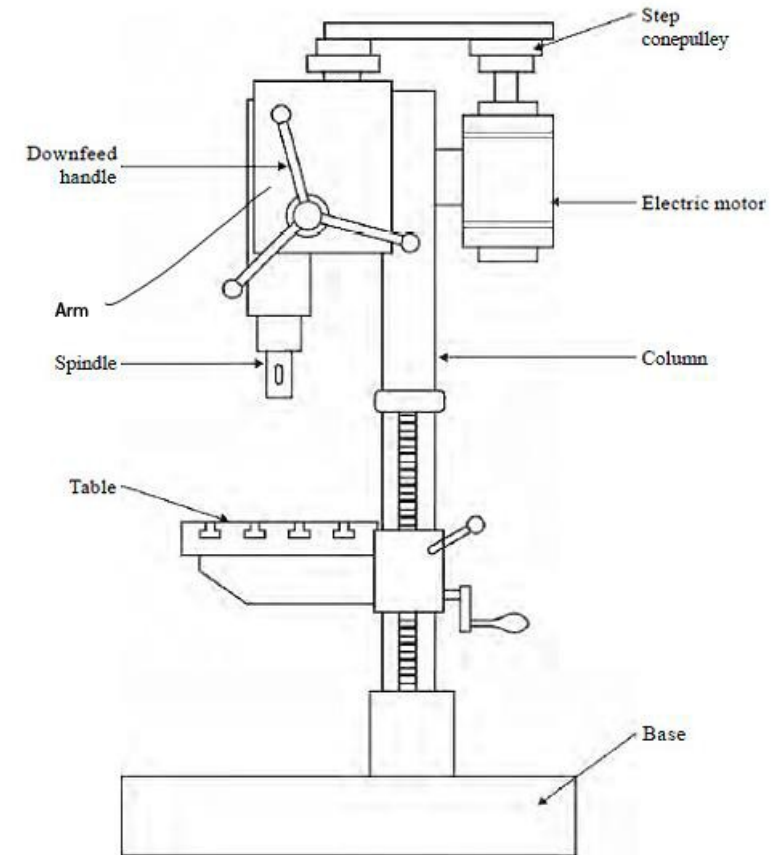
Drill Bits: Available in a vast array of sizes and types for different materials (wood, metal, plastic)



Parts of a Drilling Machine

Body Components:

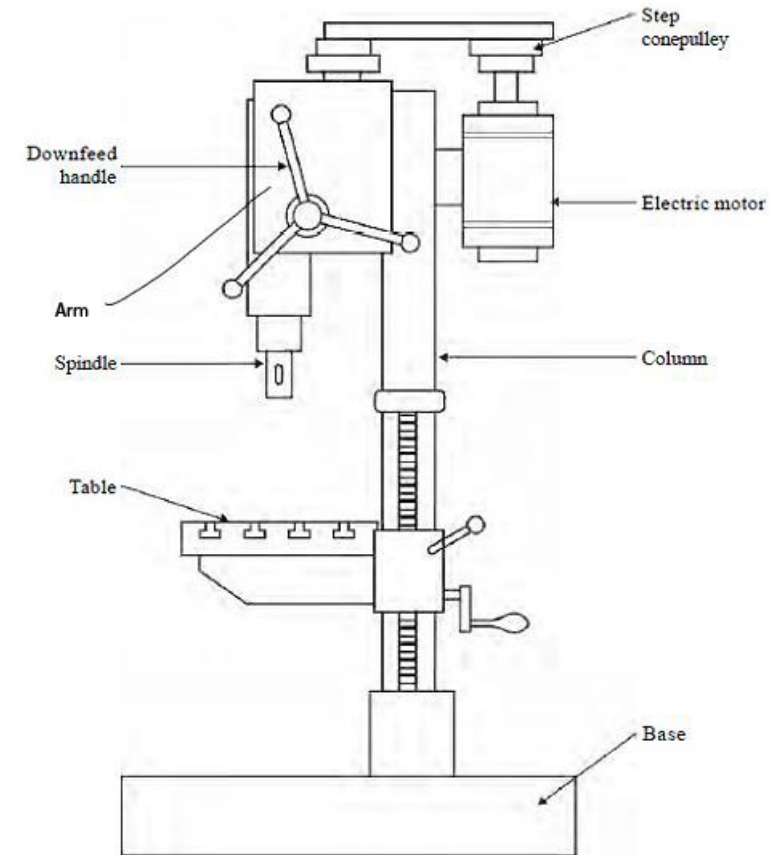
- **Base:** Provides stability and support for the entire machine. Typically made of cast iron or steel for sturdiness.
- **Column:** The central vertical pillar that supports the headstock, table, and other components.
- **Headstock:** Houses the motor and gear mechanisms that control the rotation of the drill bit.



Parts of a Drilling Machine

Drilling Components:

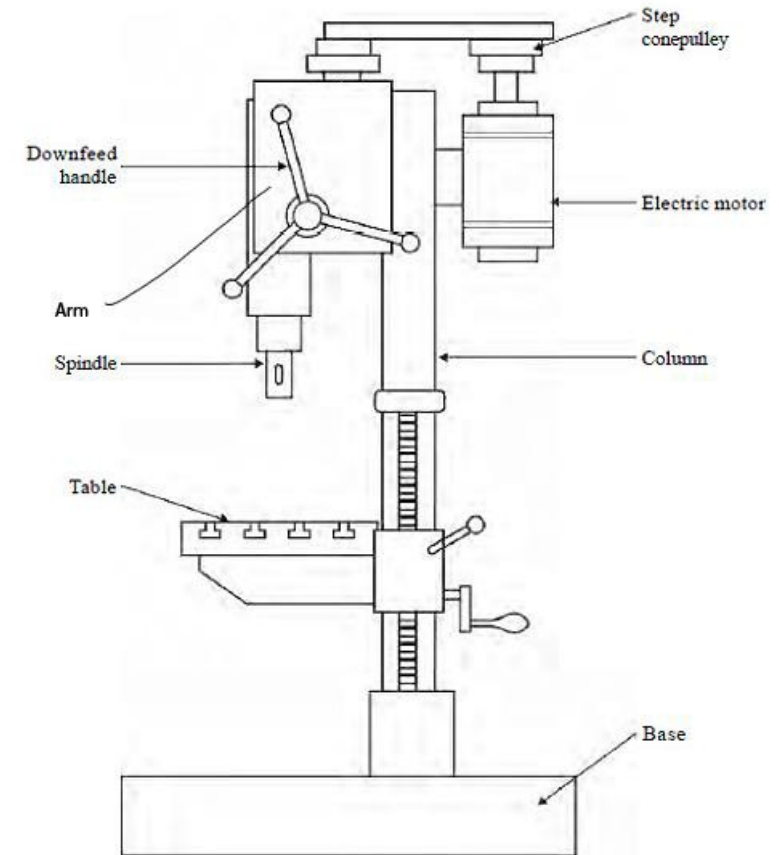
- **Spindle:** A rotating shaft within the headstock that connects the motor to the chuck and ultimately drives the drill bit.
- **Chuck:** A gripping mechanism at the bottom of the spindle that securely holds the drill bit in place.
- **Table:** A flat and adjustable work surface for securing the material being drilled.



Parts of a Drilling Machine

Additional Components:

- **Motor:** The electric motor housed within the headstock provides the power to rotate the spindle at high speeds.
- **Arm (Optional):** A long, horizontal radial arm that allows for positioning the drill head at various angles or on large work pieces.
- **Feed Mechanism:** This mechanism controls the downward movement of the drill bit into the work piece.
- **Depth Stop (Optional):** This feature allows you to set a precise drilling depth, preventing accidental over-drilling of the work piece.



Types of Drilling Machines

- **Portable Drilling Machine**

These are used in most workshops for making small holes.

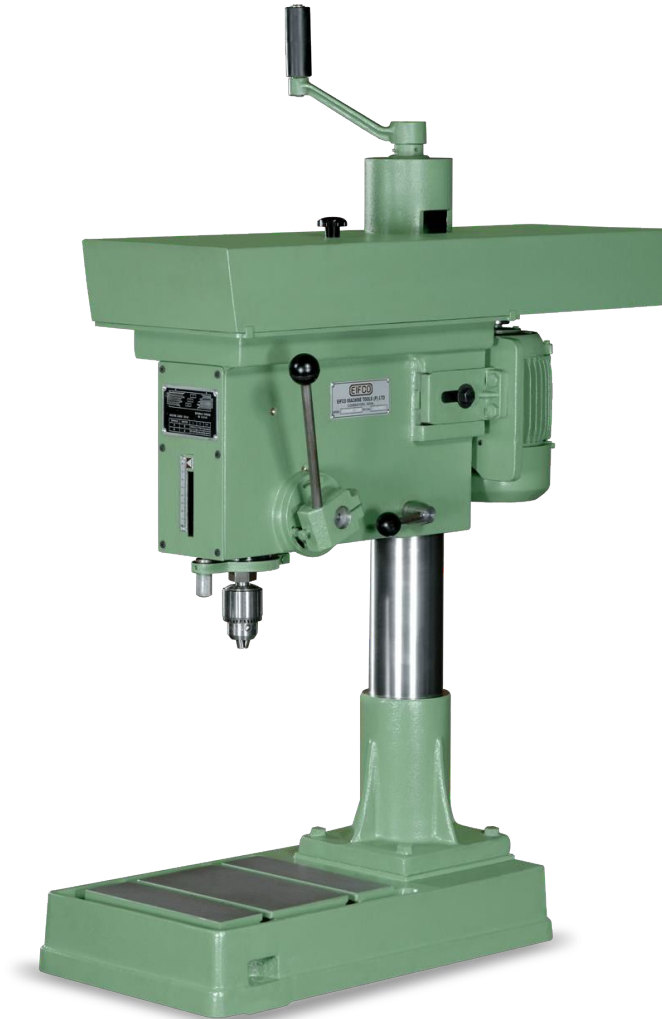


Types of Drilling Machines

- **Sensitive Drilling Machine**

These are used for sensitive materials and designed for precise drilling holes.

***A skilled operator should be present to operate these machines**



Types of Drilling Machines

- **Upright Drilling Machine**

Made similarly as sensitive drilling machine but an upright machine is stronger.

Heavy-duty jobs are better done with these machines.



Types of Drilling Machines

- **Radial Drilling Machine**

The spindle of this machine is attached to an arm that can be turned around the column.

Benefits: Angle drilling, flexible work positioning.

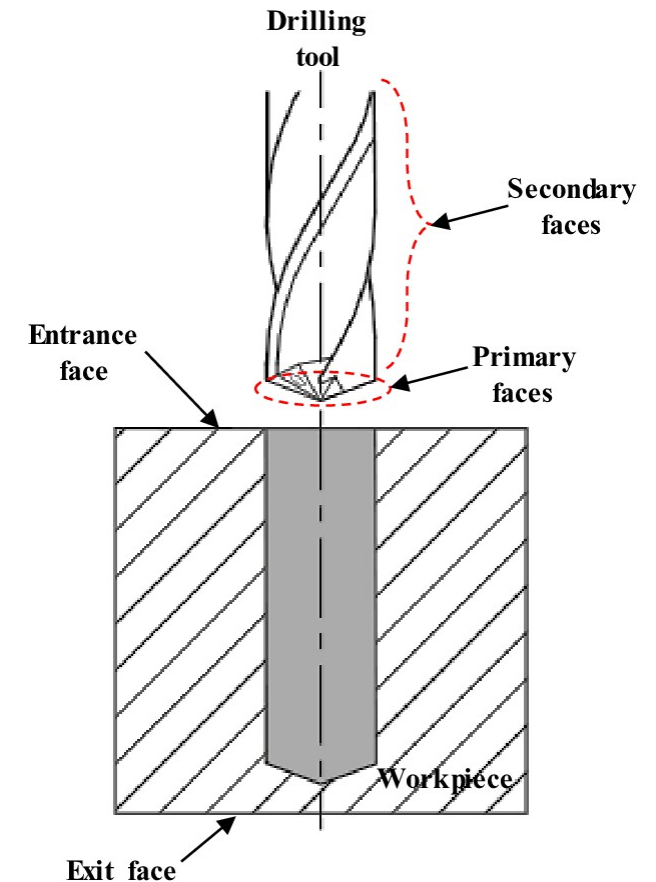


Operations on a Drilling Machine

1. Drilling

A cutting process that involves spinning a drill bit to create a circular hole in solid materials is known as drilling.

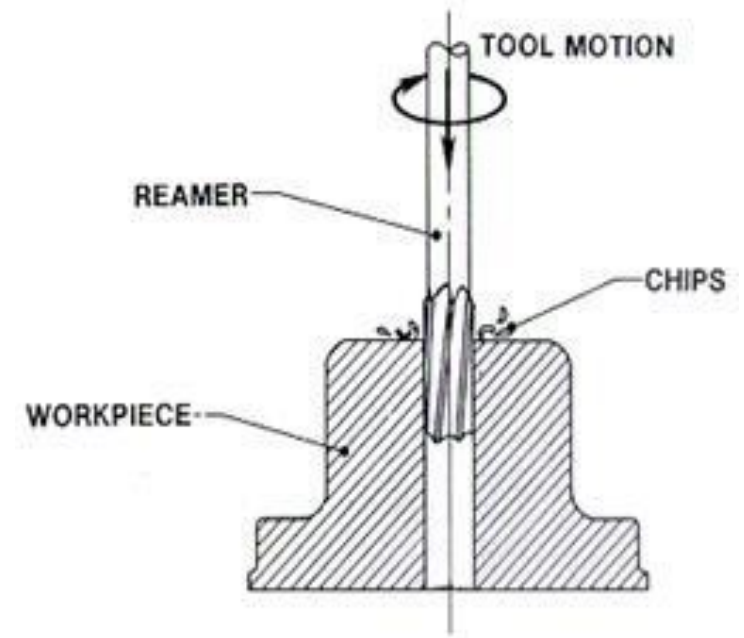
The drill bit is typically a multi-point rotary cutting tool.



Operations on a Drilling Machine

2. Reaming

A high-precision hole-finishing procedure carried out with a multi-edge tool is known as reamer. High penetration rates and shallow cuts involved in the reaming process enable close dimensional tolerance, excellent hole quality, and a high surface finish of the previously drilled hole in the work piece.

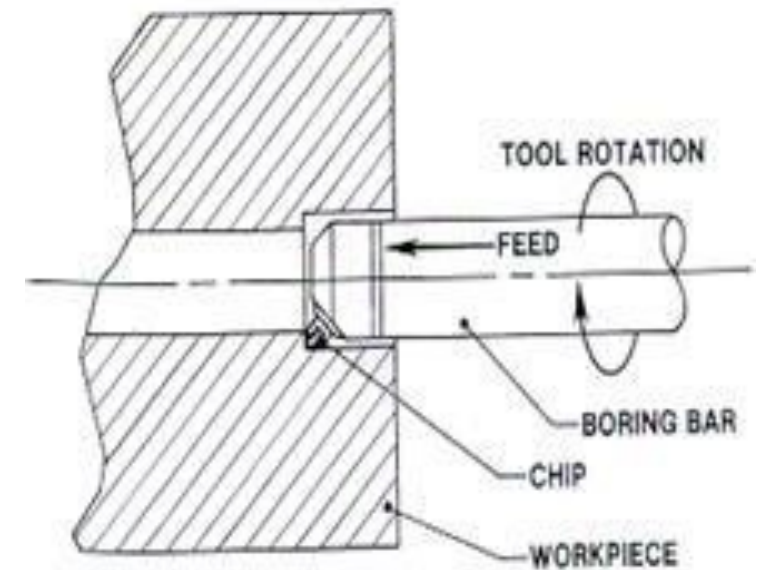


Operations on a Drilling Machine

3. Boring

A cutting process that entails enlarging an existing hole in a work piece with a single-point cutting tool or boring head is known as boring.

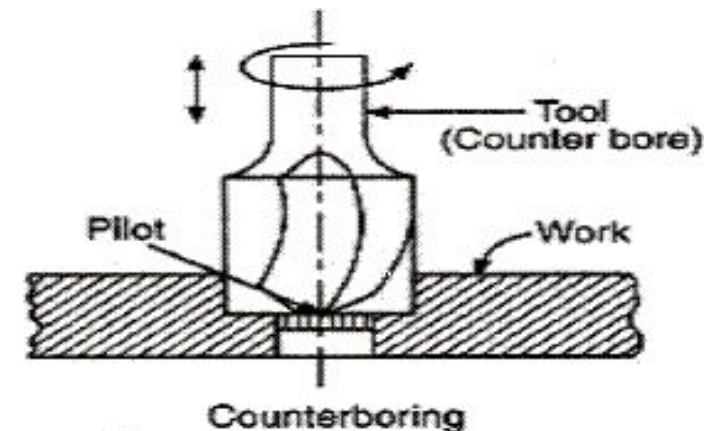
Sometimes, the process is done to correct the roundness of the previously drilled hole.



Operations on a Drilling Machine

4. Counter boring

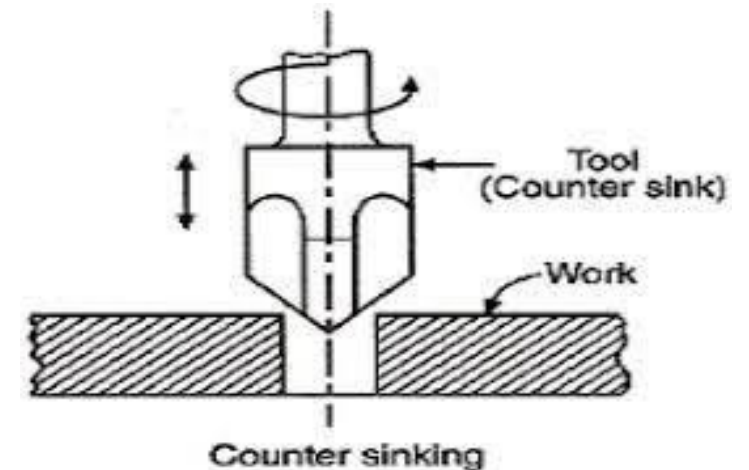
The process of enlarging a hole over a particular section in the work piece for screw clearance using counter boring tools is known as counter boring.



Operations on a Drilling Machine

5. Countersinking

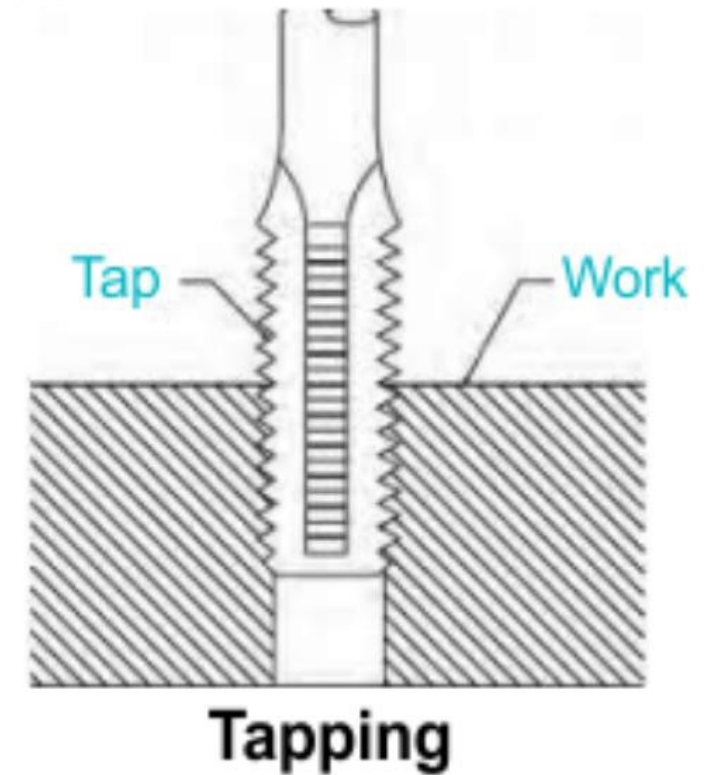
The process of enlarging one end of the hole giving it a conical shape is called countersinking. Countersinking creates a V-shaped edge near the hole's surface.



Operations on a Drilling Machine

6. Tapping

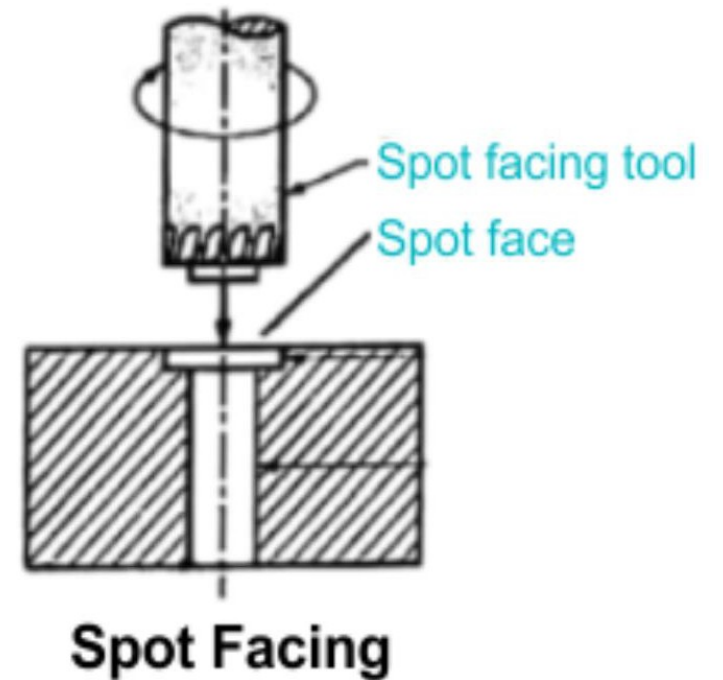
A technique used to create a flat edge on a cylindrical work piece is called spot facing. This operation involves smoothing and squaring the top surface of the hole for a nut or screw head seat.



Operations on a Drilling Machine

7. Spot Facing

A technique used to create a flat edge on a cylindrical work piece is called spot facing. This operation involves smoothing and squaring the top surface of the hole for a nut or screw head seat.



Drilling Machine Tools

Flat or Spade Drill

- When a twist drill is not available, a flat drill is used.
- It is often manufactured from a piece of circular tool steel that has been forged to shape.
- The cutting edge ranges from 90 to 120°, with relief at the front ranging from 3 to 8°.



Drilling Machine Tools

- **Straight Fluted Drill Tool**

A straight flute drill is a type of drill bit that has flutes, or grooves, that run straight up the length of the shank.

These flutes are designed to help remove chips from the hole as the drill bit cuts.

***Suited for soft material**



Drilling Machine Tools

- **Twist Drill Tool**

The twist drill is the most frequent type of drill used today. It was created by longitudinally twisting a flat piece of tool steel multiple times and then honing the surface.



Drilling Machine Tools

- **Oil Tube Drill**

The process where oil tubes are bored through the earth's surface using an earth drilling machine to form an oil well is called oil drilling. The tool used for this purpose is known as the oil tube drill.



Drilling Machine Tools

- **Centre Drill**

When drilling center holes into the ends of a work piece, these twist drills with a straight shank and two flutes are the tools that are employed. They are crafted in precise dimensions.



Drilling Machine Tools

- **Taper Shank Core Drill**

These drills are made to enlarge holes that have already been punched, drilled, or cored. The cutting edges are machined well below the center of the drill. Due to this, these drills cannot create a hole in a solid substance.



Safety Tips for Using a Drilling Machine

- Wear safety glasses and gloves
- Secure the work piece firmly
- Use the correct size and type of drill bit for the material
- Start drilling at a slow speed and gradually increase it
- Maintain a firm grip on the machine
- Never leave a running drill unattended
- Disconnect the power source before changing drill bits