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Machine Tools(MT) **(DRILLING)**

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Introduction

- *Drilling* is a metal cutting process carried out by a rotating cutting tool to make **circular holes** in solid materials.
- Tool which makes hole is called as drill bit or twist drill.



Drilling machine

- A power operated machine tool which holds the drill in its spindle rotating at high speeds and when actuated move linearly against the work piece produces a hole.

Types of drilling machine.

- Portable drilling machine
- Bench drilling machine
- Radial drilling machine
- Pillar drilling machine
- Gang drilling machine
- Multiple drilling machine

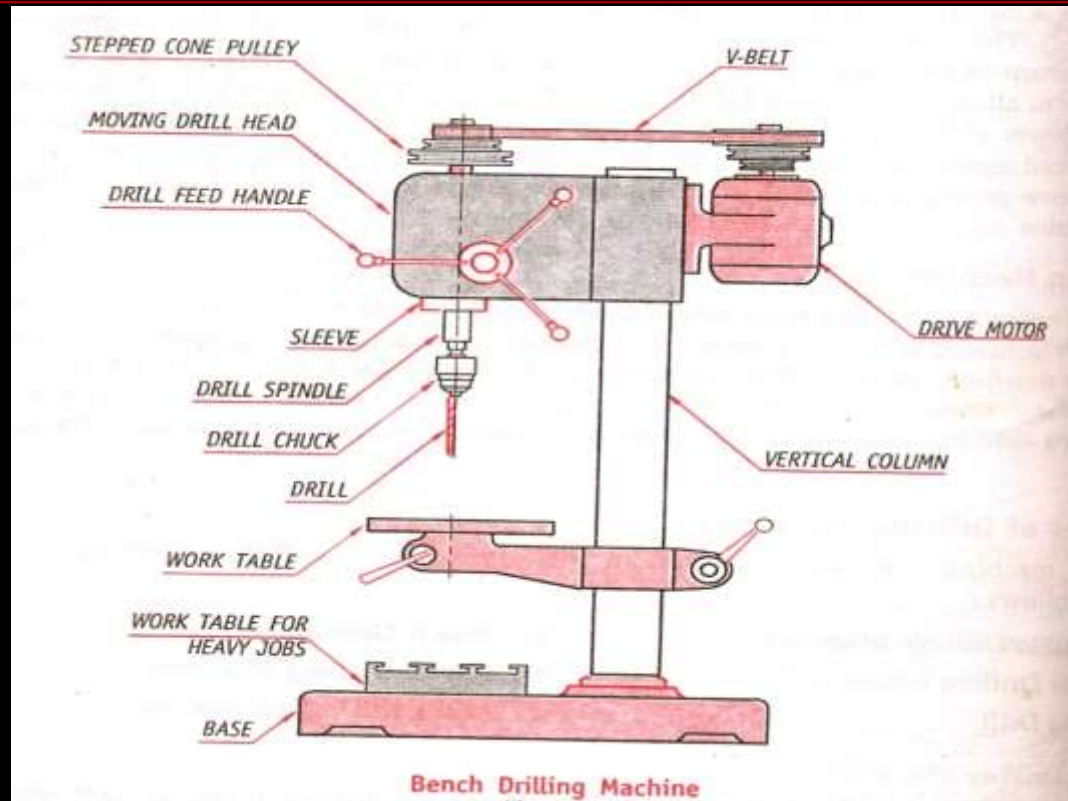
Portable drilling machine



Bench drilling machine

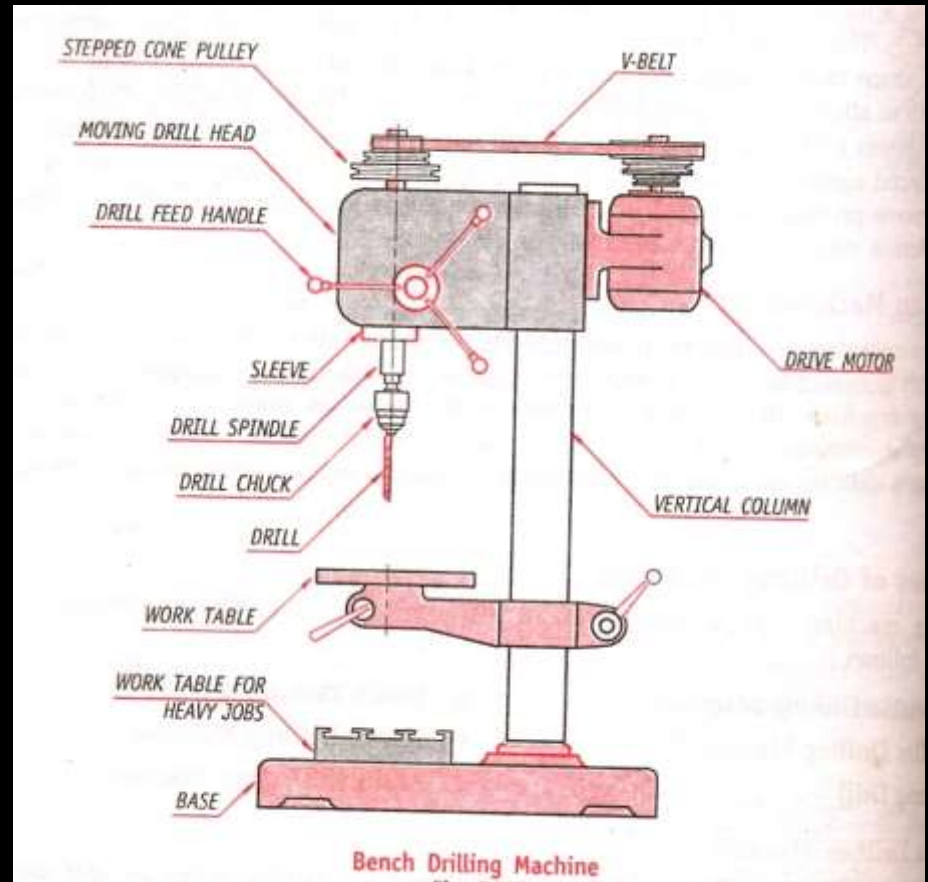
- These are light duty machines used in small workshops.
- Also called *Sensitive drilling machines* because of its accurate and well balanced spindle.
- Holes of diameter 1 mm to 15 mm.

Bench drilling machine



parts

- Vertical main column
- Base
- Moving drill head
- Work table
- Electric motor
- Variable speed gear box and spindle feed mechanism.



working

- Work piece with the exact location marked on it with the centre punch is clamped rigidly on the work table.
- spindle axis and center punch indentation are in same line.
- Machine is started and drill bit is lowered by rotating feed handle.
- Drill bit touches the work and starts removing material.

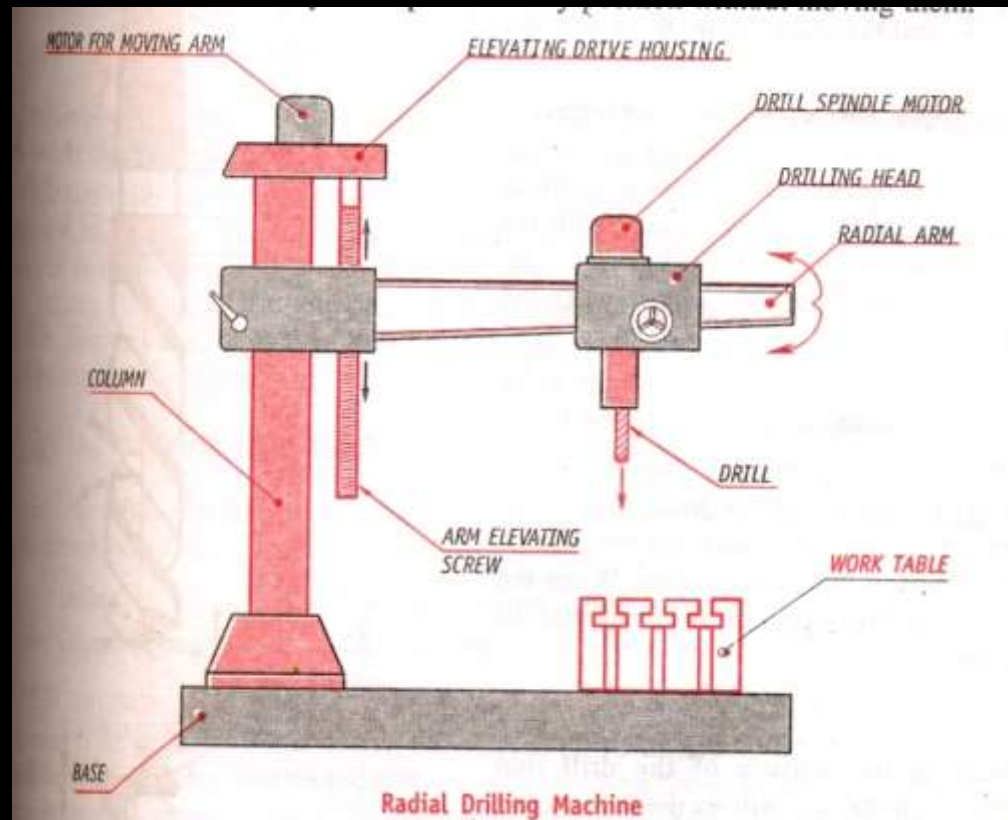
Bench drilling machine



Radial drilling machine

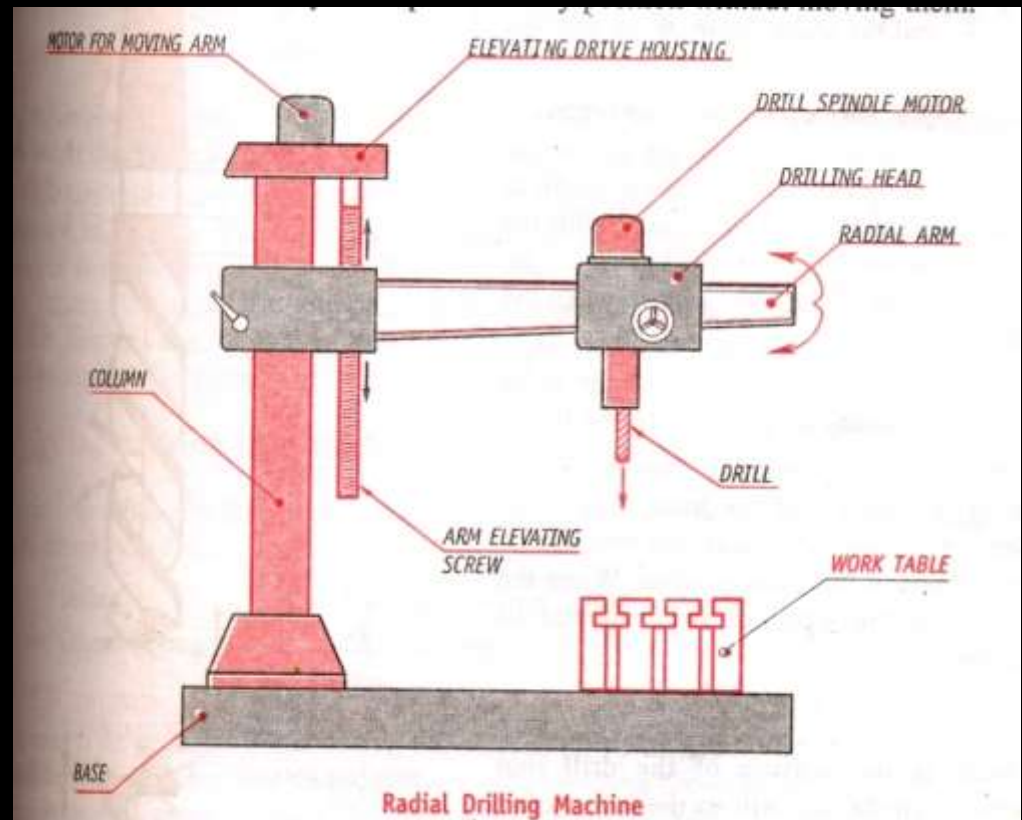
- These are heavy duty and versatile drilling machine used to perform drilling operate on large and heavy work piece.
- Holes up to 7.5 cm.

Radial drilling machine



parts

- Heavy base
- Vertical column
- Horizontal arm
- Drilling head



working

- Work piece is marked for exact location and mounted on the work table.
- Drill bit is then located by moving the radial arm and drill to the marked location.
- By starting drill spindle motor holes are drilled.

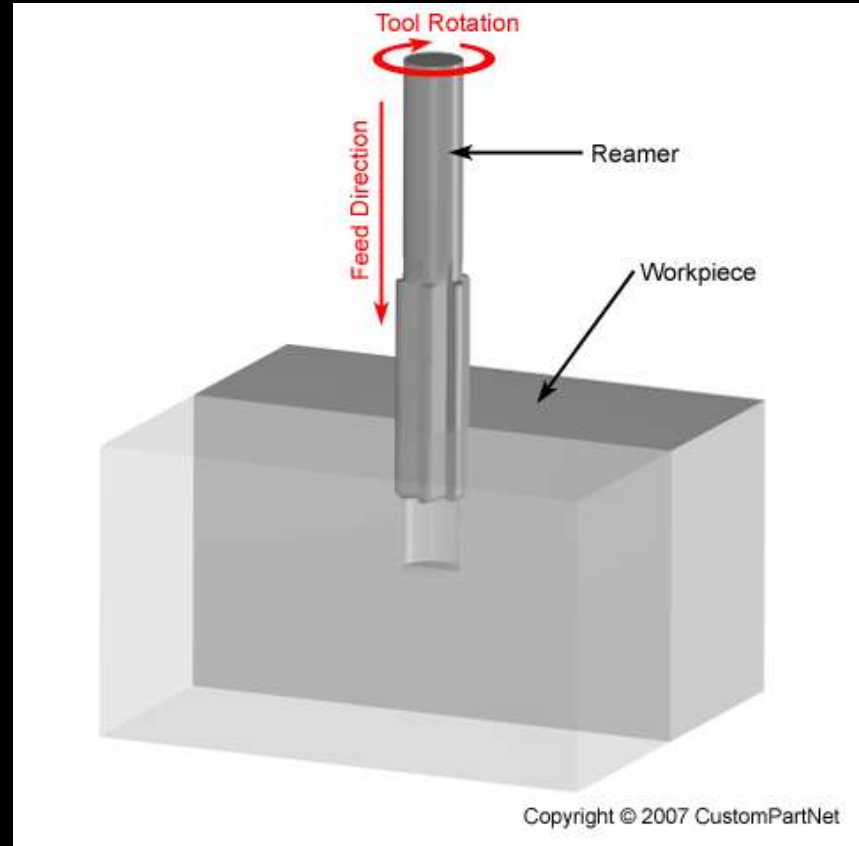
Drilling machine operation

- Reaming
- Boring
- Counter boring
- Counter sinking
- Spot facing
- Tapping

Reaming

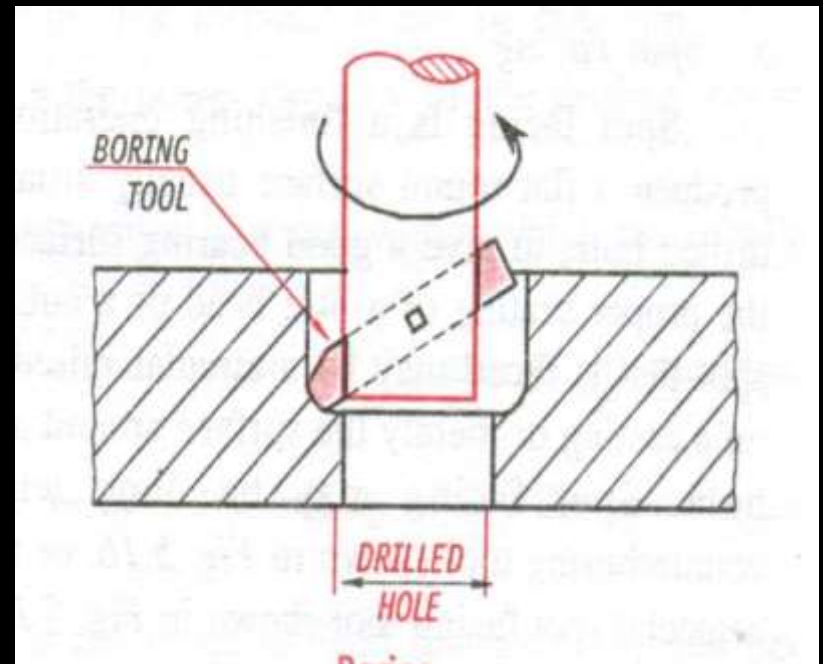
- It is a process of *smoothing* the surface of drilled holes with a tool.
- Tool is called as reamer.
- Initially a hole is drilled slightly smaller in size.
- Drill is replaced by reamer.
- Speed is reduced to half that of the drilling.

Reaming



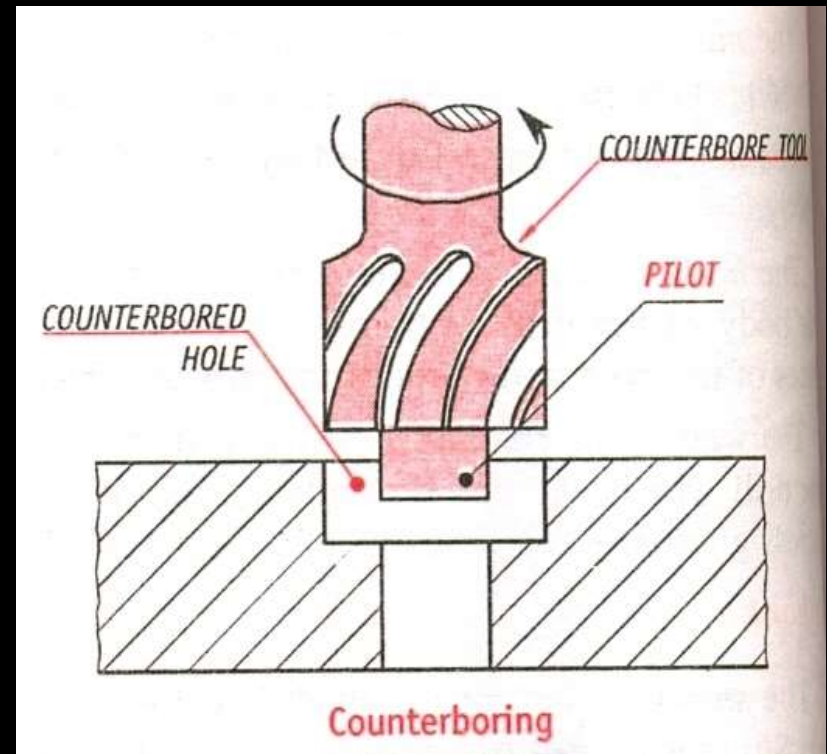
Boring

- It is process carried on a drilling machine to increase the size of an already drilled hole.
- Initially a hole is drilled to the nearest size and using a *boring* tool the size of the hole is increased.



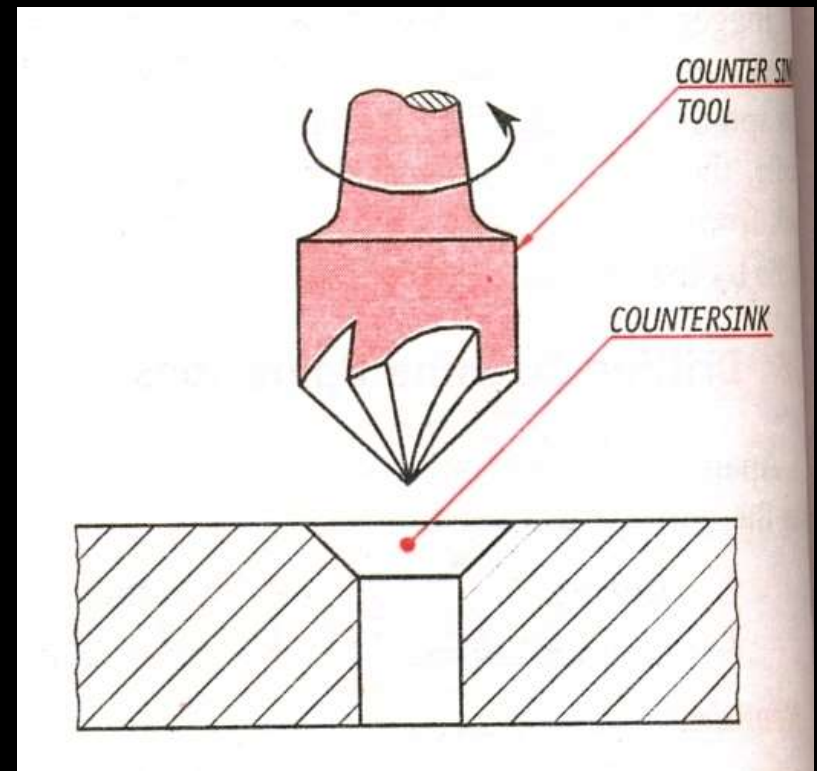
Counter boring

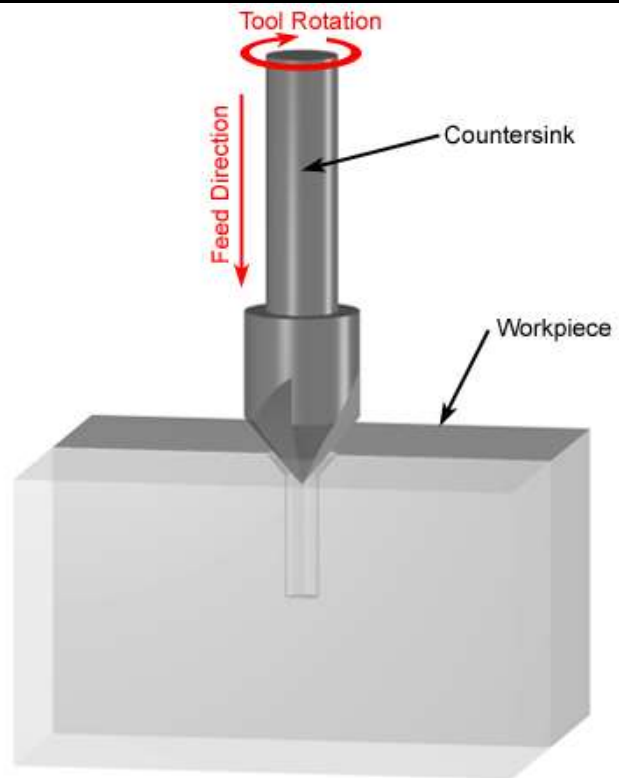
- This process involves increasing the size of a hole at only one end.
- Cutting tool will have a small cylindrical portion called *pilot*.
- Cutting speed = two-thirds of the drilling speed for the same hole.



Counter sinking

- This is an operation of making the end of a hole into a *conical shape*.
- Cutting speed = half of the cutting speed of drilling for same hole.



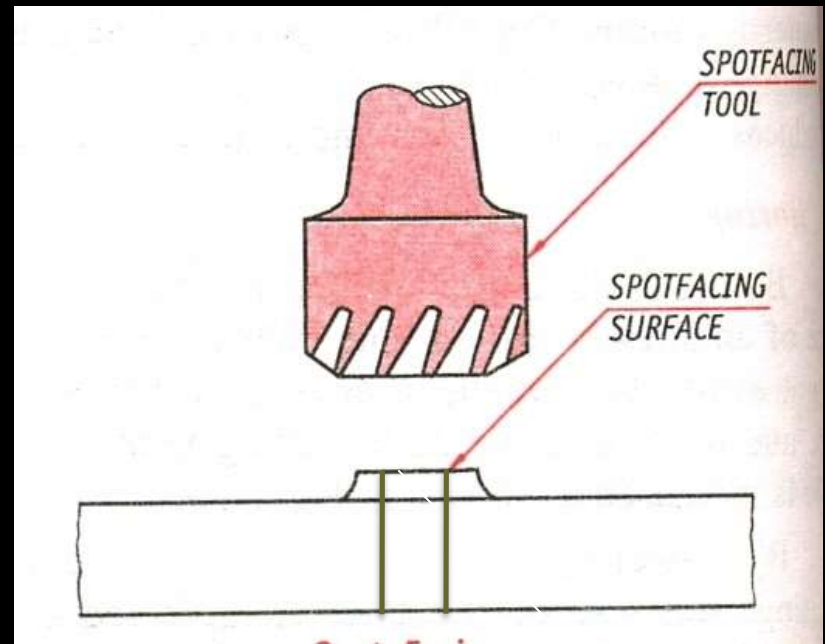


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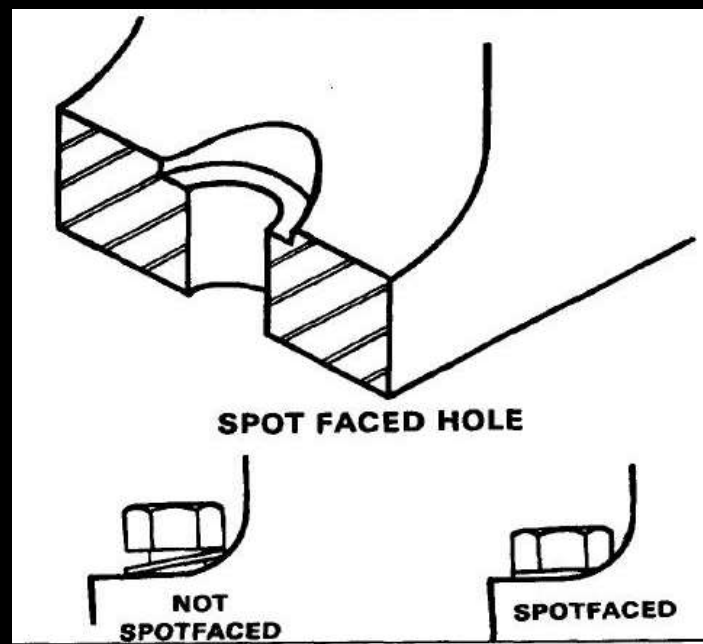


Spot facing

- It is a finishing operation to produce flat round surface usually around a drilled hole, *for proper seating of bolt head or nut.*
- It is done using a special spot facing tool.

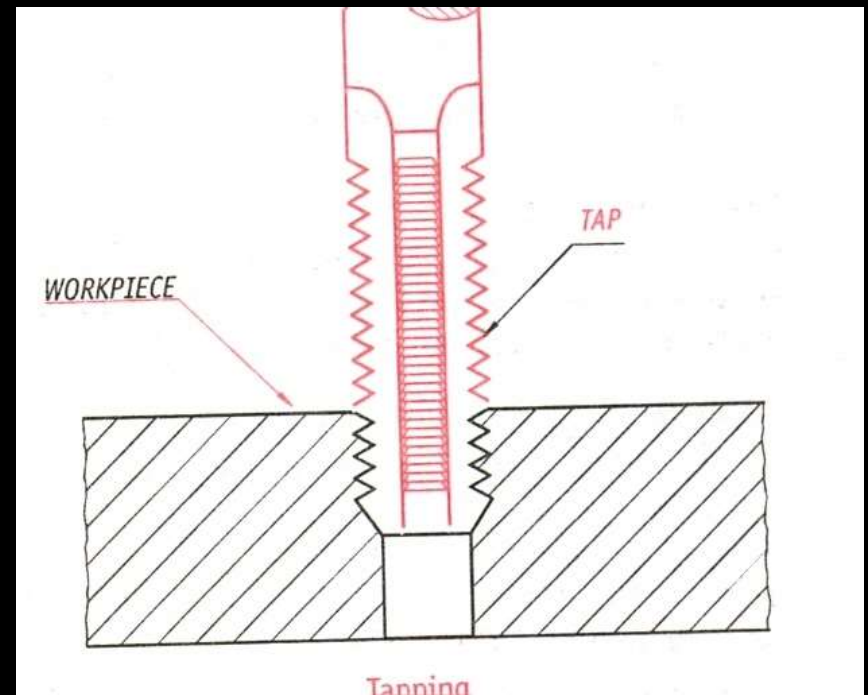






Tapping

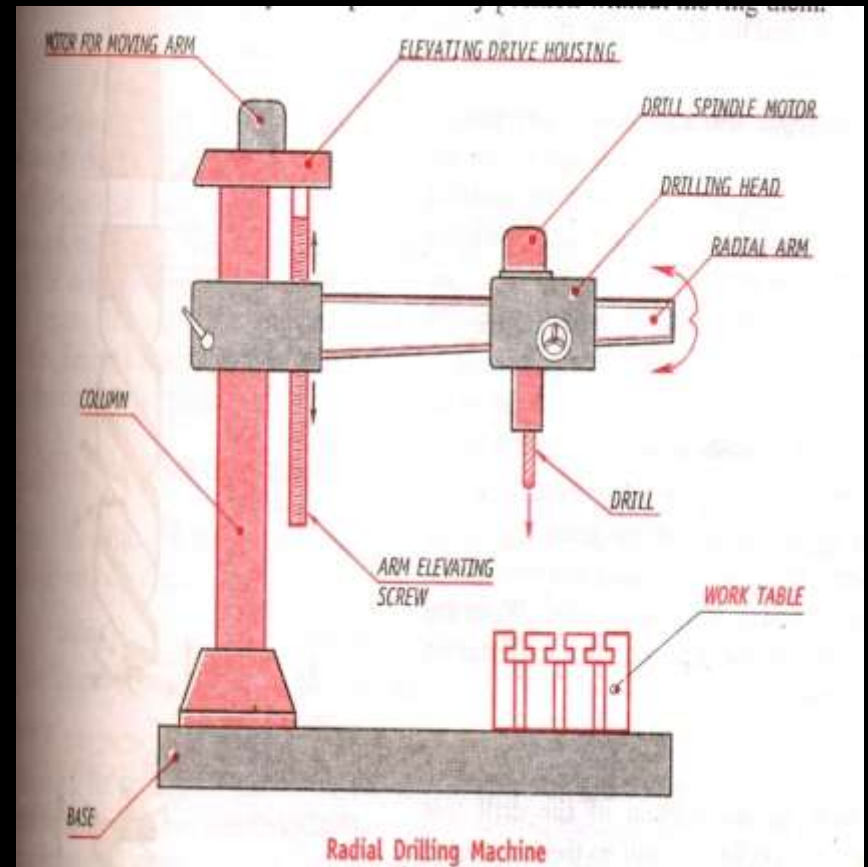
- Process of cutting internal threads with a thread tool called as *tap*.
- **Tap** is a fluted threaded tool used for cutting internal thread
- Cutting speed is very slow.



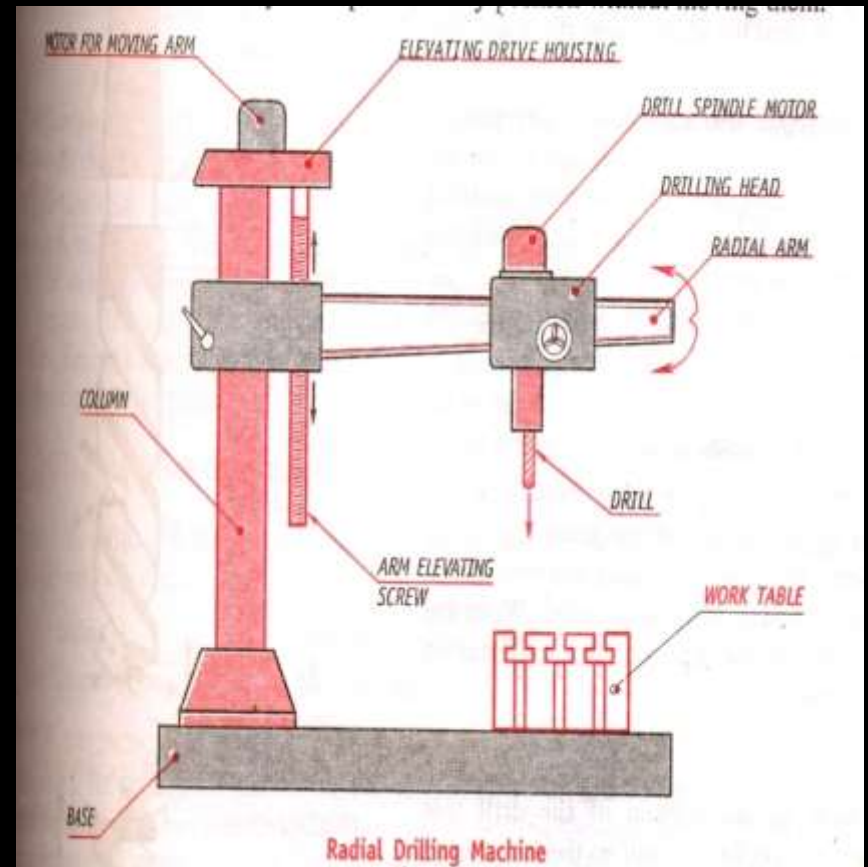


Specification of a radial drilling machine

- Power capacity eg: 1.5 hp for drilling motor and 0.5 hp for elevating motor.
- The range of speed of spindle eg: 50 to 2800 rpm.

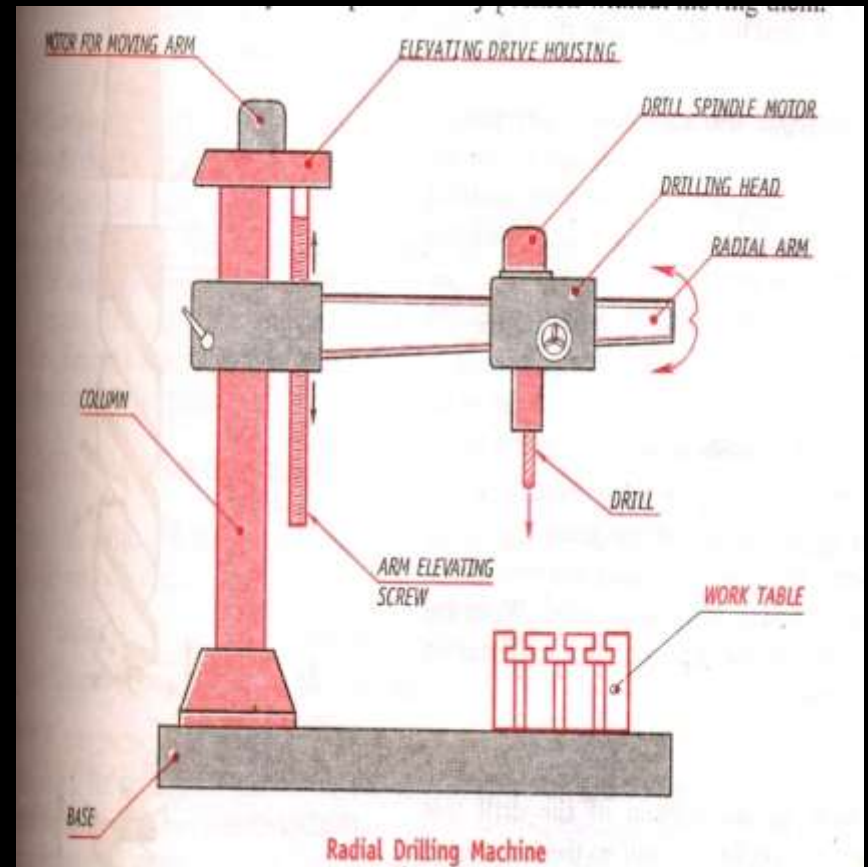


- Length of arm on which drill head can traverse. eg: 600 mm.
- Vertical movement of the arm eg: 500 mm.
- Angular swing of arm eg: 360°



DRILLING

- Range to which drill bit can reach eg: 350 mm to 900 mm.
- Drill depth eg: 32 mm for steel.



DRILLING

- DRILLING

Thank you