

Drilling machine



**ASSIGN
BUSTER**

Drilling Machine Chapter-4 ? Drilling machines ? Any component manufactured has one or more cylindrical hole in them. ? The process of making a hole is known as drilling. ? The cutting tool, which is used for making holes, is known as drill. ? The drill is a multipoint cutting tool. ?

Definition: Drilling is the operation of making holes in a work piece using a drill bit. ? The hole is generated by the rotating drill, which exerts large force on the work piece clamped rigidly on the machine table. ? What is a Drilling machine ? A power operated machine tool, which holds the drill in its spindle rotating at high speeds and when manually actuated to move linearly simultaneously against the work piece produces a hole. ? Drilling machines ?

Types Of Drilling Machines • Portable drilling machine • Bench Drilling Machine (Sensitive drilling machine) • Upright drilling machine • Radial drilling machine • Gang drilling machine • Multiple spindle drilling machine • Automatic drilling machine • Deep hole drilling machine. ? Portable drilling machine ? It is a small and compact machine, which can be conveniently held by hand, and drilling operations can be carried out. These machines are used to drill small holes in large work piece. ? Portable machines run at high speeds, powered by electrical motor or pneumatic. ? The maximum diameter of hole it can drill is 12 mm. The feed is applied by hand. ? Portable drilling machine ? Portable drilling machine ? Bench Drilling Machine (Sensitive 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. ? The main parts of the machine The main parts of the machine are Base, ? Vertical main column, ? Moving head ? Work table, ? Spindle and ? Driving mechanism. ? Bench Drilling Machine ? Upright Drilling Machine ? In <https://assignbuster.com/drilling-machine/>

construction the upright drilling machine is similar to a sensitive drilling machine for having a vertical column mounted upon the base. ? This machine is designed for handling medium sized work pieces. ? For drilling of different types of work a large number of spindle speeds and feeds are available. ? Upright Drilling Machine ? Upright Drilling Machine ? There are two types of Upright drilling machine •Round Column Section or Pillar drilling Machine Box Column Section. ? Round Column Section or Pillar Drilling Machine ? It consists of a round column that rises from the base which rests on the floor, a round table assembly, drill assembly and an arm. ? The arm and the table may be moved up and down on the column for holding work pieces of different heights and also moved in an arc up to 180° and may be clamped in any position. ? The maximum size of holes that the machine can drill is up to 50mm ? Box Column Section Upright Drilling Machine ? It has square table fitted on the slides at the front face of the machine column. The table can be moved up and down by an elevating screw. ? It is suitable to work for heavier work pieces. ? The holes above 50mm in diameter can be drilled by this type of machine. ? Radial drilling machine ? These are heavy duty and versatile drilling machine used to perform drilling operation on large and heavy work piece. ? Holes up to 7.5 cm can be drilled ? Radial Drilling Machine ? Radial Drilling Machine Base ? It is a large rectangular casting that is finished on its top to support a column at one end and work table at the other end. In some machines two or more number of bases are provided when drilling is done on a work pieces supported on anyone of the bases, another workpiece may be set up on the other for continuous operations. ? Radial Drilling Machine Column ? It is a cylindrical casting mounted vertically at one end of the base. It supports the radial arm which

may slide up or down on its face. Radial arm ? It is mounted on the column extends horizontally over the base. ? It is a casting with its front vertical face accurately machined to provide guide ways on which the drill head may be made to slide. Radial Drilling Machine Drill head ? It is mounted on the radial arm and drives the drill spindle. ? A small drill head may be made to slide on the guide ways of the arm for adjusting the position of drill spindle with respect to work. Spindle drive and feed mechanism ? A constant speed motor is mounted at the extreme end of the radial arm. ? 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. Radial drilling machines Plain radial drilling machine ? In this type of machine provisions are made for vertical adjustment of arm. ? In addition horizontal movement of drill head along the arm and circular movement of the arm in horizontal plane about the vertical column is also possible. ? Radial drilling machines Semi universal column ? In addition to the above movements the drill head can be swung about horizontal axis perpendicular to the arm. ? Other than the normal position the drill head permits to drilling a hole at an angle to the horizontal plane. Radial drilling machines Universal machine ? In addition to all the above mentioned movements. The arm holding the drill head may be rotated on a horizontal axis. ? This helps the universal machine to drill a hole on the work piece at any angle. ? Gang Drilling Machines ? Gang Drilling Machines ? Gang Drilling Machines ? The working features of a gang drilling machine are similar to other types of drilling machines. ? The only exception in a gang drilling machine is that a number of single spindles are placed side by side on a common base and are mounted on the same table. Each of these

spindles can be independently set for different speed and depth of cut. ?

Such machines are useful when number of holes of different sizes are to be drilled on the same workpiece. ? Multiple Spindle Drilling Machine ? Multiple

Spindle Drilling Machine ? Multiple Spindle drilling machine ? In these

machines the head assembly consists of multiple spindles driven by a single

motor with gear drives in the head. ? These machines are mostly used in

continuous production shops where several holes of same diameter or

different diameters are to be drilled simultaneously and accurately. ? Deep

hole drilling machine These machines are used for drilling holes where depth

exceed normal drill size. ? These machines are operated at high speed and

low feed. ? These machines are very useful for drilling deep holes in rifle

barrels, crank shafts, etc. ? The drill is withdrawn automatically each time

when it penetrates in to the work to a depth. ? Deep hole drilling machine ?

Drilling Machines Specification ? The specification of the radial drilling

machine are ? Diameter of the column ? Length of the column ? Length of

the arm ? Maximum & minimum drilling radius ? Spindle speed ? Feed. ?

Drilling Machines Specification

The other details of the drilling machine are ? Maximum diameter of the drill

that machine can operate. ? Table size ? Rise or lowering of the spindle ?

Power ? Drilling Operations The different operations that can be performed in

a drilling machine are •Drilling •Reaming •Boring •Counter boring •Counter

sinking •Spot facing •Tapping •Trepanning ? 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 single point cutting 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. 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. ? Trepanning ? It is a method of producing a hole by removing a disk shaped piece usually from flat plates. ? The hole is produced by removing the metal along the circumference of a hollow cutting tool. A hole is produced without removing much of the material from the workpiece, resulting in saving of material. ? Trepanning ? Tools used in drilling machine •Drills •Reamers •Taps ? Drills •Flat drills •Straight fluted •Twist drills ? Flat drill ? Straight fluted drills ? Straight fluted drills ? Twist Drill ? Twist drills are rotary end-cutting tools having one or more cutting lips and one or more straight or helical flutes for the passage of chips and cutting fluids. Twist drills are made with straight or tapered shanks, but most have straight shanks. ? Drill tool ? Twist Drills ? Nomenclature of Twist Drill ? Point ? Body ? shank ? Point Point is a cone shaped end of the drill. ? chisel edge or dead centre - sharp edge formed at the extreme tip of the drill by intersection of two conical surfaces. ? Point ? Flank - is the conical surface of

the point. ? Lip - is the cutting edge formed at the intersection of the flank and inner surface of the flute. ? Body ? Body is the portion of the drill that extends from the tip of the drill to the lower edge of the neck. Flutes - are helical grooves that are cut on the cylindrical surface of the drill. ? Body Margin - is the narrow strip along side of the flute. It guides and prevent rubbing of heel in the drilled hole.

Heel- is the edge formed by the intersection of the flute surface and undercut surface of body. ? Body Body clearance - narrow surface gap between the margin and undercut portion of body. Web - is the thickness between two flutes. ? Shank ? Shank is the portion of drill above the neck. ? It will be straight or tapered. ? End of the shank is provided with small taper called as tang. ? Helix angle - angle formed by leading edge of the land with a plane having axis of the drill. ? lip relief angle - the angle formed by flank and a plane at right angles to the drill axis. ? Point angle - angle formed between two flanks.