# SUBJECT- GARAGE EQIPMENT

**Screwdriver :**

It is a tool, manual or powered, for screwing and unscrewing (inserting and removing) screws. A typical simple screwdriver has a handle and a shaft, ending in a tip the user puts into the screw head before turning the handle. The shaft is usually made of tough steel to resist bending or twisting. The tip may be hardened to resist wear, treated with a dark tip coating for improved visual contrast between tip and screw—or ridged or treated for additional 'grip'. Handles are typically wood, metal, or plastiC and usually hexagonal, square, or oval in cross-section to improve grip and prevent the tool from rolling when set down. Some manual screwdrivers have interchangeable tips that fit into a socket on the end of the shaft and are held in mechanically or magnetically. These often have a hollow handle that contains various types and sizes of tips, and a reversible ratchet action that allows multiple full turns without repositioning the tip or the user's hand.

A screwdriver is classified by its tip, which is shaped to fit the driving surfaces—slots, grooves, recesses, etc.—on the corresponding screw head. Proper use requires that the screwdriver's tip engage the head of a screw of the same size and type designation as the screwdriver tip. Screwdriver tips are available in a wide variety of types and sizes (List of screw drives). The two most common are the simple 'blade'-type for slotted screws, and Phillips, generically called "cross-recess"

A wide variety of power screwdrivers range from a simple 'stick'-type with batteries, a motor, and a tip holder all inline, to powerful "pistol" type VSR (variable-speed reversible) Cordless drills that also function as screwdrivers. This is particularly useful as drilling a pilot hole before driving a screw is a common operation. Special combination drill-driver bits and adapters let an operator rapidly alternate between the two. Variations include impact drivers, which provide two types of 'hammering' force for improved performance in certain situations, and "right-angle" drivers for use in tight spaces. Many options and enhancements, such as built-in bubble levels, high/low gear selection, magnetic screw holders, adjustable-torque clutches, keyless chucks, 'gyroscopic' control, etc., are available.

A wrench is a tool used to provide grip and mechanical advantage in applying torque to turn objects—usually rotary fasteners, such as nuts and bolts—or keep them from turning.

In Commonwealth English (excluding Canada), spanner is the standard term. The most common shapes are called open-ended spannerand ring spanner. The term wrench is generally used for tools that turn non-fastening devices (e.g. tap wrench and pipe wrench), or may be used for a monkey wrench - an adjustable pipe wrench

In North American English, wrench is the standard term. The most common shapes are called open-end wrench and box-end wrench. In American English, spanner refers to a specialised wrench with a series of pins or tabs around the circumference. (These pins or tabs fit into the holes or notches cut into the object

to be turned.) In American commerce, such a wrench may be called a spanner wrench to distinguish it from the British sense of spanner.

Higher quality wrenches are typically made from chromium-vanadium alloy tool steels and are often drop-forged. They are frequently chrome-plated to resist corrosion and for ease of cleaning.

Hinged tools, such as pliers or tongs, are not generally considered wrenches in English, but exceptions are the plumber wrench (pipe wrench in British English) and Mole wrench (sometimes Mole grips in British English).

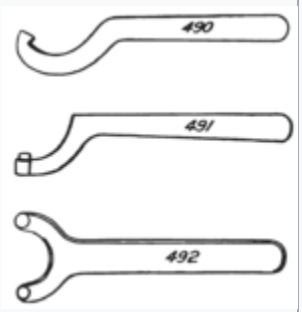
The word can also be used in slang to describe an unexpected obstacle, for example, "He threw a spanner into our plans" (in U.S. English, "monkey wrench").

Types:

| American name | British/Commonwealth name | Description | Group | |
|---|---|---|---|---|
|  | open-end wrench | open-ended spanner | A one-piece wrench with a U-shaped opening that grips two opposite faces of the bolt or nut. This wrench is often double-ended, with a different-sized opening at each end. The ends are generally oriented at an angle of around 15 degrees to the longitudinal axis of the handle. This allows a greater range of movement in enclosed spaces by flipping the wrench over. | common |
|  | box-end wrench | ring spanner | A one-piece wrench with an enclosed opening that grips the faces of the bolt or nut. The recess is generally a six-point or twelve-point opening for use with nuts or bolt heads with a hexagonal shape. The twelve-point fits onto the fastening at twice as many angles, an advantage | common |

| American name | British/Commonwealth name | Description | Group | |
|---|---|---|---|---|
| | | | where swing is limited. Eight-point wrenches are also made for square-shaped nuts and bolt heads. Ring spanners are often double-ended and usually with offset handles to improve access to the nut or bolt. | |
|  | combination wrench | combination spanner<br>open-ring spanner | A double-ended tool with one end being like an open-end wrench or open-ended spanner, and the other end being like a box-end wrench or ring spanner. Both ends generally fit the same size of bolt. | common |
|  | flare-nut wrench<br>tube wrench<br>line wrench | flare spanner<br>flare nut spanner<br>brake spanner<br>crow's-foot spanner | A wrench that is used for gripping the nuts on the ends of tubes. It is similar to a box-end wrench but, instead of encircling the nut completely, it has a narrow opening just wide enough to allow the wrench to fit over the tube, and thick jaws to increase the contact area with the nut. This allows for maximum contact on plumbing nuts, which are typically softer metals and therefore more prone to damage from open-ended wrenches. | common |
|  | ratcheting box wrench | ratcheting ring spanner | A type of ring spanner, or box wrench, whose end section ratchets. Ratcheting can be reversed by flipping | common |

| American name | British/Commonwealth name | Description | Group | |
|---|---|---|---|---|
| | | | over the wrench, or by activating a reversing lever on the wrench. This type of wrench combines compact design of a box wrench, with the utility and quickness of use of a ratchet wrench. A variety of ratcheting mechanisms are used, from simple pawls to more complex captured rollers, with the latter being more compact, smoother, but also more expensive to manufacture. The one pictured also features a drift pin on the tail. | |
|  | flex-head socket wrench<br>Saltus wrench | scaffolders spanner | Similar in concept to a socket wrench. A Saltus wrench features a socket permanently affixed to a handle. Sockets are not interchangeable as with a socket wrench. The socket often rotates around the handle to allow the user to access a fastener from a variety of angles. Commonly a Saltus wrench is part of a double-ended wrench, with an open-end type head on the opposite side from the socket head. | common |

| American name | British/Commonwealth name | Description | Group | |
|---|---|---|---|---|
|  | spanner wrench or simply spanner [referring to any of these]; [when specifying pin vs hook vs C, the same terms are used as in British English] | pin spanner<br>hook spanner<br>C spanner<br>pin face spanner | A wrench with one or several pins or hooks, designed to drive spanner head screws, threaded collars and retainer rings, shafts, and so on. Note the difference in the American and British senses of the word "spanner". In American English, "spanners" are a subset of the class of tools called "wrenches". | common |
|  | striking face box wrench<br>slammer wrench<br>slugger wrench<br>hammer wrench | slogging spanner<br>flogging spanner | This is a specialized thick, short, stocky wrench with a block end to the handle specifically designed for use with a hammer, enabling one to impart great force. Used commonly with large fasteners, especially a nut and stud which both have index marks: the nut is screwed hand-tight, then further tightened with the striking wrench a known number of index marks calculated from the elasticity of the bolt or stud, thus giving precise torque (preload). Striking wrenches also provide shock and high force used to release large and/or stuck nuts and bolts; and when space does not allow room for a large wrench. | common |

| American name | British/Commonwealth name | Description | Group | |
|---|---|---|---|---|
|  | adjustable wrench<br>adjustable end wrench<br>Crescent wrench | adjustable spanner<br>shifting spanner<br>shifter wrench | The most common type of adjustable wrench in use today. The adjustable end wrench differs from the monkey wrench in that the gripping faces of the jaws are displaced to a (typically) 15 degree angle relative to the tool's handle, a design feature that facilitates the wrench's use in close quarters. The modern adjustable end wrench was invented by Johan Petter Johansson [4]of Bahco. The common use of "Crescent wrench" to describe this design is derived from the Crescent brand, owned by Apex Brands, Inc. Apex Tool Group, LLC. | adjustable |
|  | self-adjusting wrench | self-adjusting spanner | With a serrated jaw which is self-tightening. | adjustable |
|  | monkey wrench | gas grips<br>King Dick | An old type of adjustable wrench with a straight handle and smooth jaws whose gripping faces are perpendicular to the handle. | historical |
|  | pipe wrench<br>monkey wrench | Stillson wrench<br>Stillsons<br>Pipe wrench | A tool that is similar in design and appearance to a monkey wrench, but with self-tightening properties and hardened, serrated jaws that securely grip soft iron pipe and pipe fittings. Sometimes known by the original patent | adjustable |

| American name | British/Commonwealth name | Description | Group | |
|---|---|---|---|---|
| | | | holder's brand name as a "Stillson wrench". | |
|  | socket wrench | socket wrench socket spanner | A hollow cylinder that fits over one end of a nut or bolt head. It may include a handle, if it does not then it is often just referred to as a socket and is usually used with various drive tools to make it a wrench or spanner such as a ratchet handle, a tee bar (sliding tommy bar) bar or a knuckle bar (single axis pivot). It generally has a six-point, eight-point or twelve-point recess, may be shallow or deep, and may have a built-in universal joint. (The photo shows both ratchet and sockets.) | socket |
|  | clamp ratchet wrench | clamp ratchet spanner | An open-ended multi-size ratchet wrench.<br>The ratcheting mechanism allows the nut to be clamped-on or loosened with a reciprocating motion; flip the wrench to change direction of the drive. The wrench takes the advantage of the clamp action to allow multiple sizes in both SAE and metric standards. Each wrench typically will allow up to 3 non-metric sizes and 3 metric sizes. | adjustable |

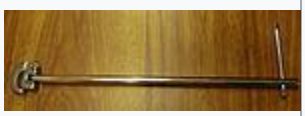
| American name | British/Commonwealth name | Description | Group | |
|---|---|---|---|---|
|  | breaker bar<br>break-over handle | knuckle bar<br>jointed nut spinner<br>flex head nut spinner<br>Power Bar | This tool is a long non-ratcheting bar that allows the user to impart considerable torque to fasteners, especially in cases where corrosion has resulted in a difficult-to-loosen part. | socket |
|  | crowfoot wrench<br>crow's-foot wrench | crow's foot | A type of wrench designed to use the same drive sizes as socket wrenches, but non-cylindrical in shape. The ends are the same as those found on the open-end, box-end, or the flare-nut wrenches. These wrenches are used when torque must be measured, or when the application precludes the use of a regular socket or wrench. Also used in place of conventional open/box wrenches where the wrenches are large, usually at a lower cost, or for when space and weight restrictions are critical. | socket |
|  | ratchet wrench | ratchet handle | It contains a one-way mechanism which allows the socket to be turned without removing it from the nut or bolt simply by cycling the handle backward and forward. (The photo shows both ratchet and sockets.) | socket |
|  | speed handle<br>speed wrench | speed handle<br>crank | A crank-shaped handle that drives a socket. The socket-driving analog of the brace | socket |

| American name | British/Commonwealth name | Description | Group | |
|---|---|---|---|---|
| | | handle<br>speed brace | used to drive a drill bit. Used instead of a ratchet in a few contexts when it can save substantial time and effort—that is, when there is a lot of turning to be done (many fasteners), ample room to swing the handle, ample access to the fastener heads, etc. Has less leverage than a conventional ratchet wrench. Used occasionally in automotive repair or job shop work. | |
|  | torque wrench | torque wrench | A socket wrench drive tool that is employed to impart a precise amount of torque to a fastener, essential in many cases during the assembly of precision mechanisms. | socket |
|  | Allen wrench<br>Allen key<br>hex key<br>L wrench | Allen key | A wrench used to turn screw or bolt heads designed with a hexagonal socket (recess) to receive the wrench. The wrenches come in two common forms: L-shaped and T-handles. The L-shaped wrenches are formed from hexagonal wire stock, while the T-handles are the same hex wire stock with a metal or plastic handle attached to the end. There are also indexable-driver-bits that can be used in indexable screwdrivers. | keys |

| American name | British/Commonwealth name | Description | Group | |
|---|---|---|---|---|
|  | Bristol wrench<br>Bristol spline wrench | ? | Another wrench designed for internal socket-head screws and bolts. The cross-section resembles a square-toothed gear. Not a common design, it is chiefly used on small set screws. | keys |
|  | Torx wrench | Torx key | An internal socket-head screw design. The cross-section resembles a star. Commonly used in automobiles, automated equipment, and computer components as it is resistant to wrench cam-out and so suitable for use in the types of powered tools used in production-line assembly. | keys |
|  | alligator wrench | ? | A formerly common type of wrench that was popular with mechanics, factory workers, and farmers for maintenance, repair and operations tasks in the days when fasteners often had square rather than hex heads. The wrench's shape suggests the open mouth of an alligator. | historical |
|  | cone wrench | cone spanner | A thin open-end wrench used to fit narrow wrench flats of adjustable bearing bicycle hubs. Called a "cone" wrench because it fits wrench flats of the cone section of a "cup and cone" hub, this tool is also used with some other adjustable hub bearings. The | specialty |

| American name | British/Commonwealth name | Description | Group | |
|---|---|---|---|---|
| | | | wrench is very thin so has little strength; to compensate, cone wrenches typically have a large head. Most bicycle front hubs use a 13 mm; most rears use 15 mm. | |
|  | die-stock<br>die wrench[5] | die stock<br>die holder | A double-handled wrench for turning the dies used in threading operations (cutting the male threads such as on a bolt). | specialty |
|  | drum key<br>lug wrench<br>drum wrench | drum key | A small, square-head socket wrench used on drum (percussion musical instrument) tuning lugs and fasteners. This key is often interchangeable with radiator bleed keys. | specialty |
|  | spark plug wrench | box spanner<br>tube spanner<br>spark plug spanner | A tube with six-sided sockets on both ends. It is turned with a short length of rod (tommy bar or T bar) inserted through two holes in the middle of the tube. | common |
| | drum wrench<br>bung wrench | ? | A tool commonly used to open bungs on large 55-gallon drums (cylindrical containers). | specialty |
| | fire hydrant wrench(hose connection) | ? | The hose connection has a threaded collar with a protruding pin. From the handle of the wrench an arc has at its end a loop to engage the pin. | specialty |

| American name | British/Commonwealth name | Description | Group | |
|---|---|---|---|---|
|  | fire hydrant wrench (valve operator) | ? | This is a pentagonal (five-sided) box wrench. The unusual shape of the lug makes the valve tamper-resistant: with the opposite faces nonparallel, unauthorized opening of the hydrant is more difficult without a suitable tool. | specialty |
|  | curb key | Toby key | This is a wrench for opening and closing valves on municipal water pipes (often at the curb, hence the name). The valve usually has a rectangular lug and is set deep into the ground, requiring the key. | specialty |
| | golf shoe spike wrench | ? | A T-handle wrench with two pins and clearance for the spike—allows removal and insertion of spikes in shoes. | specialty |
| | head nut wrench | ? | A flat wrench with a circular hole and two inward protruding pins to engage slots in the nut. This type of nut is used on bicycles to secure the front fork pivot bearing to the headpiece of the frame. | specialty |

| American name | British/Commonwealth name | Description | Group | |
|---|---|---|---|---|
|  | 4-way lug wrench<br>wheel lug cross wrench<br>cross rim wrench<br>spider wrench | wheel brace<br>tyre spanner | A socket wrench used to turn lug nuts<br>on automobile wheels. | specialty |
|  <br>  | oil-filter wrench | oil filter wrench<br>chain wrench | A type of wrench for removing cylindrical oil filters. It may be either a strap-type wrench or a socket. | specialty |
|  | plumber wrench | multigrips<br>multigrip pliers | A tool to screw (rotate with force)<br>various pipes during plumbing. | specialty |
| | ? | rigger-jigger | A spanner can be used in attaching riggers<br>to rowing boats with offset to allow users fingers to keep grip when flush with boat.<br>10 mm at one end, 13 mm at the other. | specialty |
|  | basin wrench<br>sink wrench | basin wrench | A self-tightening wrench mounted at the end of a shaft with a transverse handle at the opposite end. Used to tighten or loosen fasteners | specialty |

| American name | British/Commonwealth name | Description | Group | |
|---|---|---|---|---|
| | | | located in recesses. | |
|  | dogbone wrench | dumbbell spanner | A compact spanner for multiple sizes, usually used for bicycles | specialty |
|  | spoke wrench | nipple wrench spoke key | A wrench with a clearance slot for a wire wheel spoke such as a bicycle wheel and a drive head for the adjustment nipple nut. The handle is offset to make the wrench more convenient to grip, and the handle is short to fit between spokes, allowing the wrench to turn 360 degrees without being removed. | specialty |
|  | spud wrench | podging spanner podger | A steel erecting tool which consists of a normal wrench at one end and a spike (drift pin) at the other, used for lining up bolt holes (typically when mating two pipe flanges). | specialty |
|  | chain whip | | A self-tightening wrench that engages the teeth of a chain drive sprocket, and used typically to remove bicycle cogsets. Similar to a strap wrench, but uses positive engagement rather than friction, and so needs to grab only one end of the chain. | specialty |

| American name | British/Commonwealth name | Description | Group | |
|---|---|---|---|---|
|  <br>  | strap wrench<br>chain wrench | strap wrench<br>chain wrench | A self-tightening wrench with either a chain or strap of metal, leather, or rubber attached to a handle, used to grip and turn smooth cylindrical objects (such as automotive oil filters). It relies entirely on friction between the strap or chain and the object to be manipulated. Similar to a pipe wrench, but uses a chain similar to a drive chain or strap, instead of an adjustable jaw. The links of the chain have extended pegs which fit into grooves in the front of the handle, with one end of the chain attached permanently to the handle. This is used in situations where pipe wrenches cannot maintain a proper grip on an object such as a wet or oily pipe. Larger versions of chain wrenches are sometimes known as "bull tongs" and are used with large diameter pipe such as is used deep wells. | specialty |
|  | tap wrench<br>tap handle<br>T-handle | tap wrench | A double-handled wrench for turning the square drive on taps used in threading operations (cutting the female threads such as within a nut) or a precision reamer. | specialty |
| | tappet wrench | ? | A spanner of small to moderate size constructed | specialty |

| American name | British/Commonwealth name | Description | Group | |
|---|---|---|---|---|
| | | | similarly to an open ended wrench, but with a thinner cross section. Its purpose is to apply torque to the fasteners found on the valve trains of older engines, especially automobile engines, where the valve train required adjustment of the tappets (also known as lifters). Tappets, push rods, rocker arms and similar adjustable pieces are often equipped with locknuts which are thinner than standard nuts, due to space limitations. Frequently, the hex section of the adjustment is contiguous to the lock nut, thus requiring a thinner "tappet wrench" to be used. | |
|  | tuning wrench | tuning "T" hammer piano tuning lever | A socket wrench used to tune some stringed musical instruments. Similar, and in some cases identical to drum tuning keys, but often provide greater torque due to the higher tension of strings. | specialty |
| | wing nut wrench | | A tool specifically for use with wing nuts, allowing the application of greater torque than is possible by hand. It is generally advised[by whom?] not to use such spanners for tightening the wing nut, but rather only for loosening. It is a "hand saver" more than anything | specialty |

| American name | British/Commonwealth name | Description | Group | |
|---|---|---|---|---|
| | | | else. | |
| | graduated wrench[citation needed] | ? | An adjustable wrench with a small number (usually 2–4) of discrete sizes. This is sometimes used as an inexpensive substitute for a monkey wrench. | |
| | power wrench | ? | A broad type of wrenches that use electricity or compressed air to power the wrench. | power |
|  | impact wrench<br>impact driver | pneumatic spanner<br>windy spanner<br>rattle gun<br>impact driver<br>Windy gun | A powered wrench which delivers quick, repeated impulses of torque. Typically powered by air, but can also be electric. Most people have heard its familiar rap-rap-rap noise while being used in an auto repair shop. Although many professionals use them to tighten lug nuts on vehicle wheels, do-it-yourselfers should use a torque wrench since an impact wrench can often over-torque and damage the threads on lug nuts and wheel studs. Impact wrenches are great for loosening stubborn, difficult-to-remove nuts and bolts. | power |

Other types of keys[edit]

These types of keys are not emically classified as wrenches by English speakers, but they are etically similar in function to wrenches.

| | American name | British/Commonwealth name | Description | Group |
|---|---|---|---|---|
|  | chuck key | chuck key | A key used to tighten or loosen a chuck.[6] | household/industrial |
|  | church key, bottle opener | church key, bottle opener | A key used to remove bottle caps or to pierce can lids.[7] | household |
|  | paint can key | ? | A key used to open the lids of paint cans. Its upturned edge helps to apply a levering motion to the crimped lip of the can lid. | household |
|  | sillcock key | sillcock key, loose key, tap key | A key used to open or close sillcock valves. Many are designed the same way as a spider-type lug wrench, with four common sizes (one on each end) built into one portable tool. | household |
|  | window crank | window crank | A socket-like key slipped over the splined shaft that operates the opening and closing of some types of window. | household |

| | American name | British/Commonwealth name | Description | Group |
|---|---|---|---|---|
|  | sardine can key | sardine tin key | A key used in opening the lids of canned fish or canned meat. A tab on the metal lid fits into the slot in the shaft of the key and the lid is wound onto the key, tearing it away from the can. | household |
|  | dental key | dental key | A key formerly used in dentistry for leverage in pulling teeth | historical |

**FILES:**

Detail of a double-cut flat file showing cutting surfaces milled on both wide and narrow faces

A file is a tool used to remove fine amounts of material from a workpiece. It is common in woodworking, metalworking, and other similar trade and hobby tasks. Most are hand tools, made of a case hardened steel bar of rectangular, square, triangular, or round cross-section, with one or more surfaces cut with sharp, generally parallel teeth. A narrow, pointed tang is common at one end, to which a handle may be fitted.

A rasp is a form of file with distinct, individually cut teeth used for coarsely removing large amounts of material.

Files have also been developed with abrasive surfaces, such as natural or synthetic diamond grains or silicon carbide, allowing removal of material that would dull or resist metal, such as ceramic.

File Types and Uses

| Name | Image | Description |
|---|---|---|
| Mill file | | The most common shape, single-cut, rectangular in cross section, with an even thickness throughout their length; they may be either parallel sided or taper slightly in width from heel to end[8] |
| Flat file | | Similar to a mill file, but may be double-cut |
| Hand file | | Parallel in width and tapered in thickness, used for general work |
| Square file | | Gradually tapered and cut on all four sides. Used for a wide variety of tasks |
| Three square/Triangular file | | Triangular in cross-section, which may taper gradually, often to a point on smaller files. The sides may be equal in cross-section, or have two long and one short surface |
| Round/Rat tail | | Round in cross-section and gradually tapered over their length. They are used for enlarging round holes or cutting scalloped edges |
| Half round file | | Has one flat and one convex surface, and either tapering slightly or maintaining an even thickness, width, or both over their length |
| Combination file | | Tangless, flat sided or half-round, with two to four cutting surfaces, typically including a combination of single cut, double cut, or rasp |

Crossing files are half round on two sides with one side having a larger radius than the other. Tapered in width and thickness. For filing interior curved surfaces. The double radius makes possible filing at the junction of two curved surfaces or a straight and curved surface.

Joint round edge files are parallel in width and thickness, with rounded edges. The flats are safe (no teeth) and cut on the rounded edges only. Used for making joints and hinges.

Barrette files are tapered in width and thickness, coming to a rounded point at the end. Only the flat side is cut, and the other sides are all safe. For doing flat work.

Checkering files parallel in width and gently tapered in thickness. They have teeth cut in a precise grid pattern, and are used for making serrations and doing checkering work, as on gunstocks.

Planemaker's float Floats are straight, single-cut files which taper used for cutting, flattening and smoothing wood, particularly in making wooden hand planes.

Crochet files are tapered in width and gradually tapered in thickness, with two flats and radiused edges, cut all around. Used in filing junctions between flat and curved surface, and slots with rounded edges.

Knife files are tapered in width and thickness, but the knife edge has the same thickness the whole length, with the knife edge having an arc to it. Used for slotting or wedging operations.

Pippin files are tapered in width and thickness, generally of a teardrop cross section and having the edge of a knife file. Used for filing the junction of two curved surfaces and making V-shaped slots.

Half round ring files taper in width and thickness, coming to a point, and are narrower than a standard half round. Used for filing inside of rings.

Round parallel files are similar to round files, except that they do not taper. Shaped like a toothed cylinder.

Equalling files are parallel in width and thickness. Used for filing slots and corners.

Slitting files are parallel in width with a diamond-shaped cross section. Thinner than knife files and use for filing slots.

Nut files are fine, precise files in sets of graduated thickness, used by luthiers for dressing the slots at the end of the neck which support the strings of guitars, violins etc., in the correct position.

Pillar files are parallel in width and tapered in thickness for perfectly flat filing. Double cut top and bottom with both sides safe, these are long, narrow files for precision work.

Warding files are parallel in thickness, tapered in width, and thin. Like a hand or flat file that comes to a point on the end. Used for flat work and slotting.

Dreadnought (curved teeth) and millenicut (straight teeth) files both have heavily undercut, sharp but coarse teeth. Both can be used for rapidly removing large quantities of material from thick aluminum alloy, copper or brass. Today, the millenicut and dreadnought have found a new use in removing plastic filler materials such as two-part epoxies or styrenes such as those commonly used in automobile body repairs.

Farrier Rasp files are tanged rasps used mainly by farriers and blacksmiths. They are flat with a rasp on one side and double cut on the Reverse.

**CHISELS:**

A chisel is a tool with a characteristically shaped cutting edge (such that wood chisels have lent part of their name to a particular grind) of blade on its end, for carving or cutting a hard material such as wood, stone, or metal by hand, struck with a mallet, or mechanical power.[1]The handle and blade of some types of chisel are made of metal or of wood with a sharp edge in it.

Chiselling use involves forcing the blade into some material to cut it. The driving force may be applied by pushing by hand, or by using a mallet or hammer. In industrial use, a hydraulic ram or falling weight ('trip hammer') may be used to drive a chisel into the material.

A gouge (one type of chisel) serves to carve small pieces from the material, particularly in woodworking, woodturning and sculpture. Gouges most frequently produce concave surfaces. A gouge typically has a 'U'-shaped cross-section.

**HACKSAW:**

Typical full-size hacksaw frame, with 12" blade

A hacksaw is a fine-toothed saw, originally and mainly made for cutting metal. The equivalent saw for cutting wood is usually called bow saw.

Most hacksaws are hand saws with a C-shaped frame that holds a blade under tension. Such hacksaws have a handle, usually a pistol grip, with pins for attaching a narrow disposable blade. The frames may also be adjustable to accommodate blades of different sizes. A screw or other mechanism is used to put the thin blade under tension.

On hacksaws, as with most frame saws, the blade can be mounted with the teeth facing toward or away from the handle, resulting in cutting action on either the push or pull stroke. In normal use, cutting vertically downwards with work held in a bench vice, hacksaw blades are set to be facing forwards.

Blades

Small hacksaw

Standard hacksaw blade lengths are 10 to 12 in (250 to 300 mm). Blades can be as small as 6 in (150 mm). Powered hacksaws may use large blades in a range of sizes, or small machines may use the same hand blades.

The pitch of the teeth can be from fourteen to thirty-two teeth per inch (TPI) for a hand blade, with as few as three TPI for a large power hacksaw blade. The blade chosen is based on the thickness of the material being cut, with a minimum of three teeth in the material. As hacksaw teeth are so small, they are set in a "wave" set. As for other saws they are set from side to side to provide a kerf or clearance when sawing, but the set of a hacksaw changes gradually from tooth to tooth in a smooth curve, rather than alternate teeth set left and right.

Hacksaw blades are normally quite brittle, so care needs to be taken to prevent brittle fracture of the blade. Early blades were of carbon steel, now termed 'low alloy' blades, and were relatively soft and flexible. They avoided breakage, but also wore out rapidly. Except where cost is a particular concern, this type is now obsolete. 'Low alloy' blades are still the only type available for the Junior hacksaw, which limits the usefulness of this otherwise popular saw.

For several decades now, hacksaw blades have used high speed steel for their teeth, giving greatly improved cutting and tooth life. These blades were first available in the 'All-hard' form which cut accurately but were extremely brittle. This limited their practical use to benchwork on a workpiece that was firmly clamped in a vice. A softer form of high speed steel blade was also available, which wore well and resisted breakage, but was less stiff and so less accurate for precise sawing. Since the 1980s, bi-metal blades have been used to give the advantages of both forms, without risk of breakage. A strip of high speed steel along the tooth edge is electron beam welded to a softer spine. As the price of these has dropped to be comparable with the older blades, their use is now almost universal.

The most common blade is the 12 inch or 300 mm length. Hacksaw blades have a hole at each end for mounting them in the saw frame and the 12 inch / 300 mm dimension refers to the center to center distance between these mounting holes.[3]

The kerf produced by the blades is somewhat wider than the blade thickness due to the set of the teeth. It commonly varies between 0.030 and 0.063 inches / 0.75 and 1.6 mm depending on the pitch and set of the teeth.

**PLIERS:**

Combination pliers

Pliers are a hand tool used to hold objects firmly, possibly developed from tongs used to handle hot metal in Bronze Age Europe.[1] They are also useful for bending and compressing a wide range of materials.

Generally, pliers consist of a pair of metal first-class levers joined at a fulcrum positioned closer to one end of the levers, creating short jaws on one side of the fulcrum, and longer handles on the other side.[1]This arrangement creates a mechanical advantage, allowing the force of the hand's grip to be amplified and focused on an object with precision. The jaws can also be used to manipulate objects too small or unwieldy to be manipulated with the fingers.

Pincers are a similar tool with a different type of head used for cutting and pulling, rather than squeezing. Tools designed for safely handling hot objects are usually called tongs. Special tools for making crimp connections in electrical and electronic applications are often called "crimping pliers"; each type of connection uses its own dedicated tool.

There are many kinds of pliers made for various general and specific purposes.

**REAMER:**

A reamer is a type of rotary cutting tool used in metalworking. Precision reamers are designed to enlarge the size of a previously formed hole by a small amount but with a high degree of accuracy to leave smooth sides. There are also non-precision reamers which are used for more basic enlargement of holes or for removing burrs. The process of enlarging the hole is called reaming. There are many different types of reamer and they may be designed for use as a hand tool or in a machine tool, such as a milling machine or drill press.

Types

Adjustable hand reamer.

Adjustable hand reamer

An adjustable hand reamer can cover a small range of sizes. They are generally referenced by a letter which equates to a size range. The disposable blades slide along a tapered groove. The act of tightening and loosening the restraining nuts at each end varies the size that may be cut. The absence of any spiral in the flutes restricts them to light usage (minimal material removal per setting) as they have a tendency to chatter. They are also restricted to usage in unbroken holes. If a hole has an axial split along it, such as a split bush or a clamping hole, each straight tooth will in turn drop into the gap causing the other teeth to retract from their cutting position. This also gives rise to chatter marks and defeats the purpose of using the reamer to size a hole.

Straight reamer

A straight reamer is used to make only a minor enlargement to a hole. The entry end of the reamer will have a slight taper, the length of which will depend on its type. This produces a self centering action as it enters the raw hole. The larger proportion of the length will be of a constant diameter.

Reamed holes are used to create holes of precise circularity and size, for example with tolerances of -0/+0.02 mm(.0008") This will allow the force fitting of locating dowel pins, which need not be otherwise retained in the body holding them. Other holes, reamed slightly larger in other parts, will fit these pins accurately, but not so tightly as to make disassembly difficult. This type of alignment is common in the joining of split crankcase halves such as are used in motorcycle motors and boxer type engines. After joining the halves, the assembled case may then be line bored (using what is in effect a large diameter reamer), and then disassembled for placement of bearings and other parts. The use of reamed dowel holes is typical in any machine design, where any two locating parts have to be located and mated accurately to one another - typically as indicated above, to within 0.02 mm or less than .001".

Another use of reamed holes is to receive a specialized bolt that has an unthreaded shoulder - also called a shoulder bolt. This type of bolt is commonly used to replace hot peened rivets during the seismic retrofit of structures.

Hand reamer

A hand reamer has a longer taper or lead in at the front than a machine reamer. This is to compensate for the difficulty of starting a hole by hand power alone. It also allows the reamer to start straight and reduce the risk of breakage. The flutes may be straight or spiral.

Machine reamer

Spiral fluted machine reamer

A machine reamer only has a very slight lead in. Because the reamer and work piece are pre-aligned by the machine there is no risk of it wandering off course. In addition the constant cutting force that can be applied by the machine ensures that it starts cutting immediately. Spiral flutes have the advantage of clearing the swarf automatically but are also available with straight flutes as the amount of swarf generated during a reaming operation should be very small.

Rose reamer[edit]

A rose reamer has no relief on the periphery and is offset by a front taper to prevent binding. They are secondarily used as softing reamers.

Shell reamer

Shell reamers are designed for reaming bearing and other similar items. They are fluted almost their whole length.

Tapered reamer

Four small tapered pin reamers

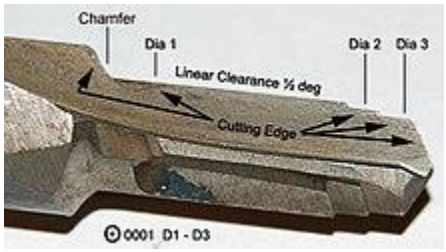
A precision tapered reamer is used to make a tapered hole to later receive a tapered pin. A taper pin is a self tightening device due to the shallow angle of the taper. They may be driven into the tapered hole such that removal can only be done with a hammer and punch. They are sized by a number sequence (for example, a No.4 reamer would use No.4 taper pins). Such precision joints are used in aircraft assembly and are frequently used to join the two or more wing sections used in a sailplane. These may be re-reamed one or more times during the aircraft's useful life, with an appropriately oversized pin replacing the previous pin.

Morse taper reamer

No. 3 morse taper reamer

A morse taper reamer is used manually to finish morse taper sleeves. These sleeves are a tool used to hold machine cutting tools or holders in the spindles of machines such as a drill or milling machine. The reamer shown is a finishing reamer. A roughing reamer would have serrations along the flutes to break up the thicker chips produced by the heavier cutting action used for it.

Combination reamer[edit]




This combination reamer was made for a long run, tight tolerance electronic parts.

A combination reamer has two or more cutting surfaces. The combination reamer is precision ground into a pattern that resembles the part’s multiple internal diameters. The advantage of using a combination reamer is to reduce the number of turret operations, while more precisely holding depths, internal diameters and concentricity. Combination reamers are mostly used in screw machines or second-

operation lathes, not with Computer Numerical Control (CNC) machines because G-code can be easily generated to profile internal diameters.

Combination reamers can be made out of cobalt, carbide, or high speed steel tooling. When using combination reamers to ream large internal diameters made out of material with lower surface feet per minute, carbide tips can be brazed onto a configured drill blank to build the reamer. Carbide requires additional care because it is very brittle and will chip if chatter occurs. It is common to use a drill bit or combination drill to remove the bulk of material to reduce wear, or the risk of the part pulling off on the combination reamer.

**FEELER GAUGE:**

Feeler gauge set

A feeler gauge is a tool used to measure gap widths. Feeler gauges are mostly used in engineering to measure the clearance between two parts.

They consist of a number of small lengths of steel of different thicknesses with measurements marked on each piece. They are flexible enough that, even if they are all on the same hinge, several can be stacked together to gauge intermediate values. It is common to have two sets for imperial units (typically measured in thousandths of an inch) and metric (typically measured in hundredths of a millimetre) measurements.

A similar device with wires of specific diameter instead of flat blades is used to set the gap in spark plugs to the correct size; this is done by increasing or decreasing the gap until the gauge of the correct size just fits inside the gap.

The lengths of steel are sometimes called leaves or blades, although they have no sharp edge.

# CHAPTER 2

# General Equipment Specifications and applications

**DRILLING MACHINE:**

Drilling is a cutting process that uses a drill bit to cut a hole of circular cross-section in solid materials. The drill bit is usually a rotary cutting tool, often multi-point. The bit is pressed against the work-piece and rotated at rates from hundreds to thousands of revolutions per minute. This forces the cutting edge against the work-piece, cutting off chips (swarf) from the hole as it is drilled.

In rock drilling, the hole is usually not made through a circular cutting motion, though the bit is usually rotated. Instead, the hole is usually made by hammering a drill bit into the hole with quickly repeated short movements. The hammering action can be performed from outside the hole (top-hammer drill) or within the hole (down-the-hole drill, DTH). Drills used for horizontal drilling are called drifter drills.

PROCESS:

Drilled holes are characterized by their sharp edge on the entrance side and the presence of burrs on the exit side (unless they have been removed). Also, the inside of the hole usually has helical feed marks.[3]

Drilling may affect the mechanical properties of the workpiece by creating low residual stresses around the hole opening and a very thin layer of highly stressed and disturbed material on the newly formed surface. This causes the workpiece to become more susceptible to corrosion and crack propagation at the stressed surface. A finish operation may be done to avoid these detrimental conditions.

For fluted drill bits, any chips are removed via the flutes. Chips may form long spirals or small flakes, depending on the material, and process parameters. The type of chips formed can be an indicator of the machinability of the material, with long chips suggesting good material machinability.

When possible drilled holes should be located perpendicular to the workpiece surface. This minimizes the drill bit's tendency to "walk", that is, to be deflected from the intended center-line of the bore, causing the hole to be misplaced. The higher the length-to-diameter ratio of the drill bit, the greater the tendency to walk. The tendency to walk is also preempted in various other ways, which include:

Establishing a centering mark or feature before drilling, such as by:

Casting, molding, or forging a mark into the workpiece

Center punching

Spot drilling (i.e., center drilling)

Spot facing, which is machining a certain area on a casting or forging to establish an accurately located face on an otherwise rough surface.

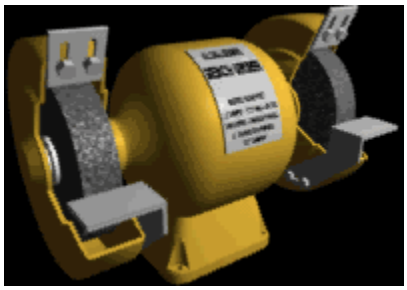
Constraining the position of the drill bit using a drill jig with drill bushings

Surface finish produced by drilling may range from 32 to 500 microinches. Finish cuts will generate surfaces near 32 microinches, and roughing will be near 500 microinches.

Cutting fluid is commonly used to cool the drill bit, increase tool life, increase speeds and feeds, increase the surface finish, and aid in ejecting chips. Application of these fluids is usually done by flooding the workpiece with coolant and lubricant or by applying a spray mist.

In deciding which drill(s) to use it is important to consider the task at hand and evaluate which drill would best accomplish the task. There are a variety of drill styles that each serve a different purpose. The subland drill is capable of drilling more than one diameter. The spade drill is used to drill larger hole sizes. The indexable drill is useful in managing chips

Bench grinder



Rotating abrasive wheel on a bench grinder.

8 in (200 mm) wire brush mounted to bench grinder (tool rest in foreground).

A bench grinder is a benchtop type of grinding machine used to drive abrasive wheels. A pedestal grinder is a similar or larger version of grinder that is mounted on a pedestal, which may be bolted to the floor or may sit on rubber feet. These types of grinders are commonly used to hand grind various cutting tools and perform other rough grinding.[1]

Depending on the bond and grade of the grinding wheel, it may be used for sharpening cutting tools such as tool bits, drill bits, chisels, and gouges. Alternatively, it may be used to roughly shape metal prior to welding or fitting.

A wire brush wheel or buffing wheels can be interchanged with the grinding wheels in order to clean or polish workpieces. Stiff buffing wheels can also be used when deburring is the task at hand. Some buffing machines (buffers) are built on the same concept as bench grinders except for longer housings and arbors with buffing wheels instead of grinding wheels.

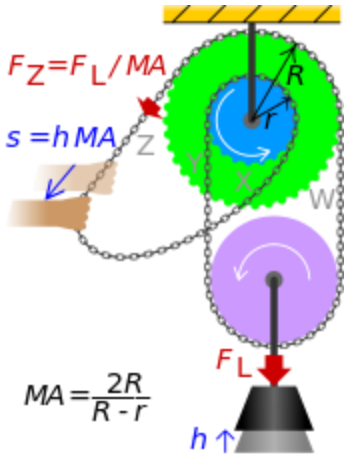
Bench grinders are standard equipment in metal fabrication shops and machine shops, as are handheld grinders (such as angle grinders and die grinders).

Hydraulic and electric hoists:

A hoist is a device used for lifting or lowering a load by means of a drum or lift-wheel around which rope or chain wraps. It may be manually operated, electrically or pneumatically driven and may use chain, fiber or wire rope as its lifting medium. The most familiar form is an elevator, the car of which is raised and lowered by a hoist mechanism. Most hoists couple to their loads using a lifting hook.

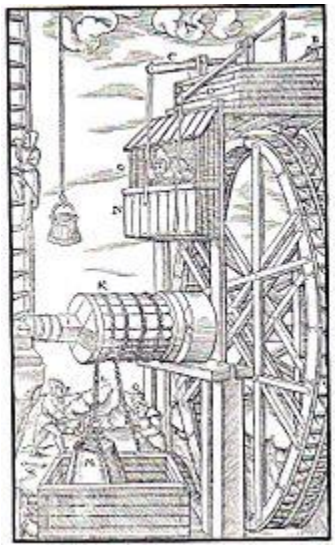
Types

Builder's hoist, with small gasoline engine




A differential pulley chain hoist

A hoist on the Trump International Hotel & Tower-Chicago



A water-powered mine hoist used for raising ore from De re metallica

The basic hoist has two important characteristics to define it: Lifting medium and power type. The lifting medium is either wire rope, wrapped around a drum, or load-chain, raised by a pulley with a special profile to engage the chain. The power can be provided by different means. Common means are hydraulics, electrical and air driven motors. Both the wire rope hoist and chain hoist have been in common use since the 1800s, however mass production of an electric hoist did not start until the early 1900s and was first adapted by Germany. A hoist can be built as one integral-package unit, designed for cost-effective purchasing and moderate use, or it can be built as a built-up custom unit, designed for durability and performance. The built-up hoist will be much more expensive, but will also be easier to repair and more durable. Package units were once regarded as being designed for light to moderate usage, but since the 60s this has changed. Built-up units are designed for heavy to severe service, but over the years that market has decreased in size since the advent of the more durable packaged hoist. A machine shop or fabricating shop will use an integral-package hoist, while a Steel Mill or NASA would use a built-up unit to meet durability, performance, and repairability requirements. NASA has also seen a change in the use of package hoists. The NASA Astronaut training pool, for example, utilizes cranes with packaged hoists.

**SPRAYER:**

A sprayer is a device used to spray a liquid.

In agriculture, a sprayer is a piece of equipment that is used to apply herbicides, pesticides, and fertilizers on agricultural crops. Sprayers range in size from man-portable units (typically backpacks with spray guns) to trailed sprayers that are connected to a tractor, to self-propelled units similar to tractors, with boom mounts of 60–151 feet in length.

Creepers and Climbers that are widely grown for their decorative appeal. These seeds have a high germination rate and require the use of conventional sowing methods. The seeds have low moisture content and they are least susceptible to any form of damage. They are provided in suitable packaging at affordable prices.