

Woodturning

Woodturning is a form of woodworking that is used to create wooden objects on a lathe. Woodturning differs from most other forms of woodworking in that the wood is moving while a stationary tool is used to cut and shape it. Many intricate shapes and designs can be made by turning wood. There are two distinct methods of turning wood: spindle turning and bowl or faceplate turning. Their key difference is in the orientation of the wood grain, relative to the axis of the lathe. This variation in orientation changes the tools and techniques used. In spindle turning, the grain runs lengthways along the lathe bed, as if a log was mounted in the lathe. Grain is thus always perpendicular to the direction of rotation under the tool. In bowl turning, the grain runs at right angles to the axis, as if a plank were mounted across the chuck. When a bowl blank rotates, the angle that the grain makes with the cutting tool continually changes between the easy cuts of lengthways and downwards across the grain to two places per rotation where the tool is cutting across the grain and even upwards across it. This varying grain angle limits some of the tools that may be used and requires additional skill in order to cope with it. In spindle turning, the wood is fixed between 2 points. The spur center digs into the wood and is powered by a motor. The other, a hard center or a live center may be a point or set of points in the tail-stock. In face plate turning, the wood is secured with screws to a faceplate or in a chuck or jig. the tail stock and a center may also be used for added support on large pieces with a faceplate. Most bowls, platters and many vessels are face plate turned, while pens, furniture legs, spindles, and some vessels are spindle turned. The method used may differ depending on the shape of the blank and the technique of the turner, and both methods may be used on the same piece. When wood is cut in such a way that the fibre being cut is not supported by the fibre below it, it tends to separate and tear. This "tear out" exhibits a rough, highly damaged looking surface texture and greatly reduces the value of any product exhibiting it. The direction of cut is different in spindle turning and faceplate turning because cutting in the wrong direction can cause tear out. Spindle turning cuts are made from high points toward the axis on the outside of the piece, and from the axis toward the outside when hollowing. When faceplate turning, the opposite applies.

The origin of woodturning dates to around 1300 BC when the Egyptians first developed a two-person lathe. One person would turn the wood with a rope while the other used a sharp tool to cut shapes in the wood.

The Romans improved the Egyptian design with the addition of a turning bow. Early bow lathes were also developed and used in Germany, France and Britain. Sometime after the turning bow was developed, a lathe was created that spun when a lever was pumped by hand. Early lathe workers would sometimes use their bare feet to hold cutting tools in place while using their hand to power the lathe. In the Middle Ages a pedal replaced hand-operated

turning, freeing both the craftsman's hands to hold the woodturning tools. The pedal was usually connected to a pole, often a straight-grained sapling. The system today is called the "spring pole" lathe (see Pole lathe). Spring pole lathes were in common use into the early 20th Century. A two-person lathe, called a "great lathe", allowed a piece to turn continuously (like today's power lathes). A master would cut the wood while an apprentice turned the crank.

The term "bodger" stems from pole lathe turners who used to make the chair legs and spindles. A bodger would typically purchase all the trees on a plot of land, set up camp on the plot, and then fell the trees and turn the wood. The spindles and legs that were produced were sold in bulk, for pence per dozen. The bodger's job was considered unfinished because he only made component parts. The term now describes a person who leaves a job unfinished, or does it badly.

During the industrial revolution the lathe was motorized, allowing turned items to be created in less time. The motor also produced a greater rotational speed for the wood, making it easier to quickly produce high quality work. Today most commercial woodturning is done by computer-operated machinery allowing for mass-production that can be created with precision and without the cost of employing craftsmen. Despite this, there is still a demand for hand-turned products. Woodturning is also a hobby enjoyed by many people.

Modern professional woodturners are typically either "production" turners producing large quantities of functional pieces, or artistic turners producing smaller numbers of pieces, often enhanced after turning by carving, piercing, coloring, applying pyrography, gilding, or a number of other techniques to produce objects for the art market.

Tools

- **roughing gouge** - a wide fluted gouge used to initially round a wooden spindle, and to roughly shape it. Generally not intended for cutting end grain due to the large cut it takes and the relatively weak tang connecting the blade to the handle. Unsafe for making bowls or any faceplate work.
- **spindle gouge or detail gouge** - a shallow fluted gouge used to create details on spindles, including beads (raised portions of the turning typically semi-circular in cross section) and coves (relieved portions of the turning).
- **bowl gouge** - a deep fluted gouge used to turn the outside and inside of bowls and vessels. Often has a thicker shaft and longer handle than a spindle gouge because it has to cut farther away from the hand rest and deal with the forces of turning a large bowl.
- **skew chisel** - a wide, steeply pointed chisel with the edge running at an angle to the length of the tool. Used to smooth flat spindles, cut beads, and

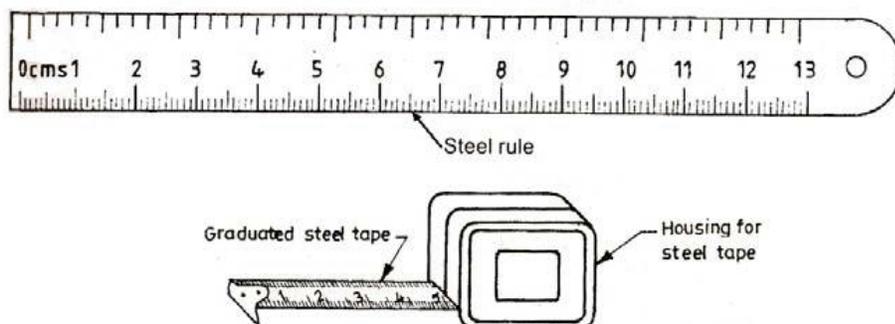
add details. Skew chisels are only used on spindle work (never on faceplate work) and are honed after sharpening to create a razor edge.

- **parting tool** - a pointed tool used to separate (part off) work from the lathe, and to create a straight edge separating large and small diameter sections - wide parting tools also called bedans are used to create evenly sized spindle sections.
- **hollowing tool** - many different types of tools used to cut out the deep sections of steep bowls, vases and hollow vessels. Often with very long handles, to maintain enough leverage when working in a deep vessel, far away from the hand rest.
- **scraper** - a tool that scrapes the wood fibres instead of cutting - these are used to smooth off wooden items cut with other tools, and to shape items that are not possible or difficult to shape with gouges. A sharp scraper has a burr at the edge which cuts the wood, only a dull scraper actually scrapes.
- **bowl saver** - a tool used to core out the inside part of a bowl, allowing the waste piece to be used to create a smaller bowl, and to limit the amount of wood chips created when hollowing out a bowl.
- **auger** - a drill bit used to drill a hole partway or all the way through a wooden item. For cutting the hole for a lamp cord, or as the first step when hollowing out a bowl or vessel
- chatter tool - a flexible scraper used to add decorative chatter marks to turned items
- **wire**- a simple wire, sometimes with handles attached at either side, for the purpose of burning lines into the piece with friction.
- there are also several tool types for special purposes, as well as tools that are a combination design of the above tools, i.e. skew/chisel combinations, thread cutting tools, ring cutting tools, medium fluted gouges, etc.

MARKING AND MEASURING TOOLS

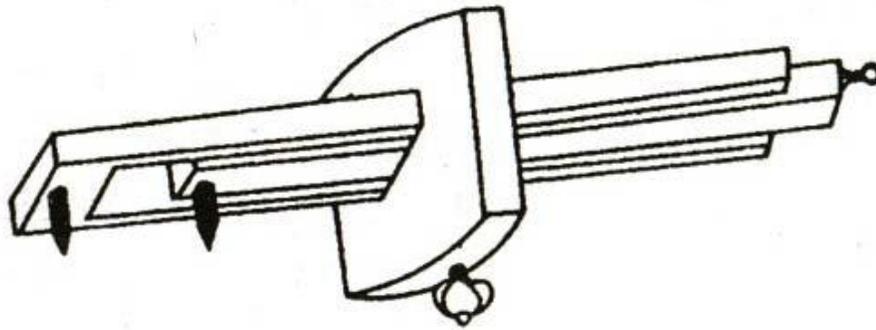
1 Steel rule and Steel tape

Steel rule is a simple measuring instrument consisting of a long, thin metal strip with a marked scale of unit divisions. It is an important tool for linear measurement. *Steel tape* is used for large measurements, such as marking on boards and checking the overall dimensions of the work.



2 Marking gauge

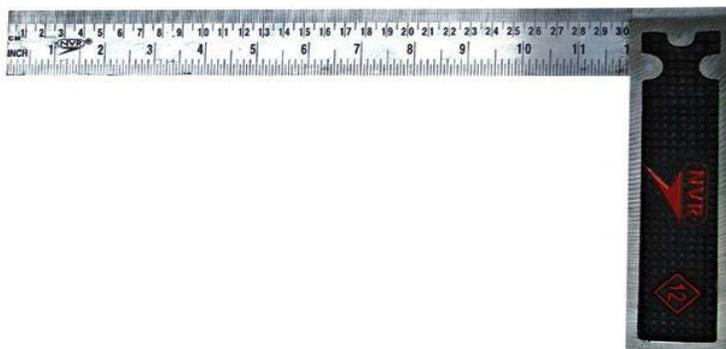
It is a tool used to mark lines parallel to the edge of a wooden piece. It consists of a square wooden stem with a sliding wooden stock (head) on it. On the stem is fitted a marking pin, made of steel. The stock is set at any desired distance from the marking point and fixed in position by a screw. It must be ensured that the marking pin projects through the stem, about 3 mm and the end are sharp enough to make a very fine line. A *mortise gauge* consists of two pins. In this, it is possible to adjust the distance between the pins, to draw two parallel lines on the stock. a. Marking gauge b. Mortise gauge



b. Mortise gauge

3 Try-square

It is used for marking and testing the squareness and straightness of planed surfaces. It consists of a steel blade, fitted in a cast iron stock. It is also used for checking the planed surfaces for flatness. Its size varies from 150 to 300 mm, according to the length of the blade. It is less accurate when compared to the try-square used in the fitting shop.



4 Compass and divider

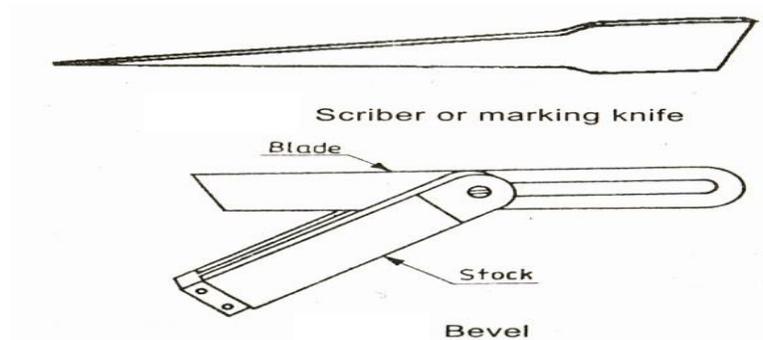
Compass and divider, are used for marking arcs and circles on the planed surfaces of the wood.

5 Scriber or marking knife

It is used for marking on timber. It is made of steel having one end pointed and the other end formed into a sharp cutting edge.

6 Bevel

It is used for laying-out and checking angles. The blade of the bevel is adjustable and may be held in place by a thumb screw. After it is set to the desired angle, it can be used in much the same way as a try-square. A good way to set it to the required angle is to mark the angle on a surface and then adjust the blade to fit the angle.



Scriber or marking knife

HOLDING TOOLS

1 Carpenter's vice

Figure 2.6 shows the carpenter's bench vice, used as a work holding device in a carpenter shop. Its one jaw is fixed to the side of the table while the other is movable by means of a screw and a handle. The Carpenter's vice jaws are lined with hard wooden faces.

PLANING TOOLS

1 Jack plane

It is the most commonly used general purpose plane. It is about 35 cm long. The cutting iron (blade) should have a cutting edge of slight curvature. It is used for quick removal of material on rough work and is also used in oblique planing.

2 Smoothing plane

It is used for finishing work and hence, the blade should have a straight cutting edge. It is about 20 to 25 cm long. Being short, it can follow even the slight depressions in the stock, better than the jack plane. It is used after using the jack plane.

3 Rebate plane

It is used for making a rebate. A rebate is a recess along the edge of a piece of wood, which is generally used for positioning glass in frames and doors.

4 Plough plane

It is used to cut grooves, which are used to fix panels in a door. Figure 2.9 shows the various types of planes mentioned above.

CUTTING TOOLS

1 Saws

A saw is used to cut wood into pieces. There are different types of saws, designed to suit different purposes. A saw is specified by the length of its toothed edge.

1 Cross-cut or hand saw

It is used to cut across the grains of the stock. The teeth are so set that the saw kerf will be wider than the blade thickness. This allows the blade to move freely in the cut, without sticking.

2 Rip saw

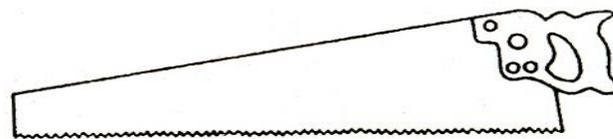
It is used for cutting the stock along the grains. The cutting edge of this saw makes a steeper angle, i.e., about 60° whereas that of crosscut saw makes an angle of 45° with the surface of the stock.

3 Tenon saw

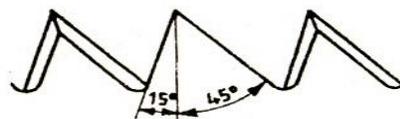
It is used for cutting the stock either along or across the grains. It is used for cutting tenons and in fine cabinet work. However, it is used for small and thin cuts. The blade of this saw is very thin and so it is stiffened with a thick back steel strip. Hence, this is sometimes called as back-saw. In this, the teeth are shaped like those of cross-cut saw.

4 Compass saw

It has a narrow, longer and stronger tapering blade, which is used for heavy works (Fig. 1.13). It is mostly used in radius cutting. The blade of this saw is fitted with an open type wooden handle.



a - Cross cut saw



b - Cross cut saw teeth

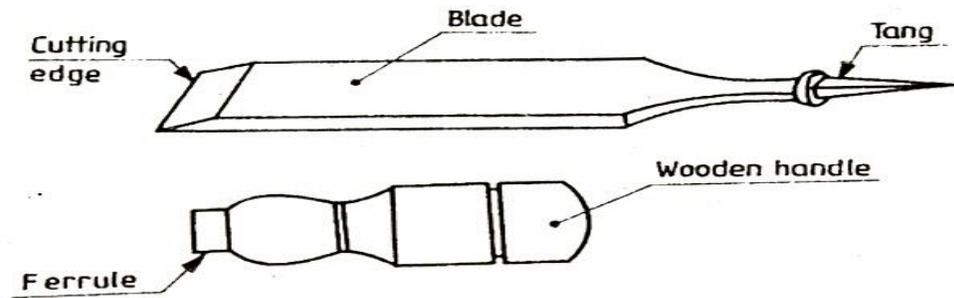


c - Rip saw teeth

Cross-cut and rip saw

Chisel

Chisels are used for cutting and shaping wood accurately. Wood chisels are made in various blade widths, ranging from 3 to 50 mm. They are also made in different blade lengths. Most of the wood chisels are made into tang type, having a steel shank which fits inside the handle. These are made of forged steel or tool steel blades.



1 Firmer chisel

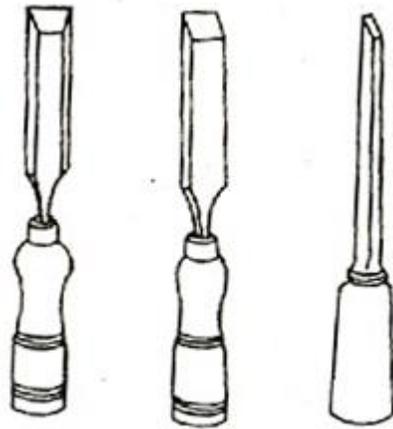
The word 'firmer' means 'stronger' and hence firmer chisel is stronger than other chisels. It is a general purpose chisel and is used either by hand pressure or by a mallet. The blade of a firmer chisel is flat, as shown in Figure 2.12 a.

2 Dovetail chisel

It has a blade with a beveled back, as shown in Figure, due to which it can enter sharp comers for finishing, as in dovetail joints.

3 Mortise chisel

It is used for cutting mortises and chipping inside holes, etc. The cross-section of the mortise chisel is proportioned to withstand heavy blows during mortising. Further, the cross-section is made stronger near the shank.



a. Firmer b. Dovetail c. Mortise

DRILLING AND BORING TOOLS

1 Carpenter's brace

It is used for rotating auger bits, twist drills, etc., to produce holes in wood. In some designs, braces are made with ratchet device. With this, holes may be made in a corner where complete revolution of the handle cannot be made. The size of a brace is determined by its sweep.

2 Auger bit

It is the most common tool used for making holes in wood. During drilling, the lead screw of the bit guides into the wood, necessitating only moderate pressure on the brace. The helical flutes on the surface carry the chips to the outer surface.

3 Hand drill

Carpenter's brace is used to make relatively large size holes; whereas hand drill is used for drilling small holes. A straight shank drill is used with this tool. It is small, light in weight and may be conveniently used than the brace. The drill bit is clamped in the chuck at its end and is rotated by a handle attached to gear and pinion arrangement.

4 Gimlet

It has cutting edges like a twist drill. It is used for drilling large diameter holes with the hand pressure.



MISCELLANEOUS TOOLS

1 Mallet

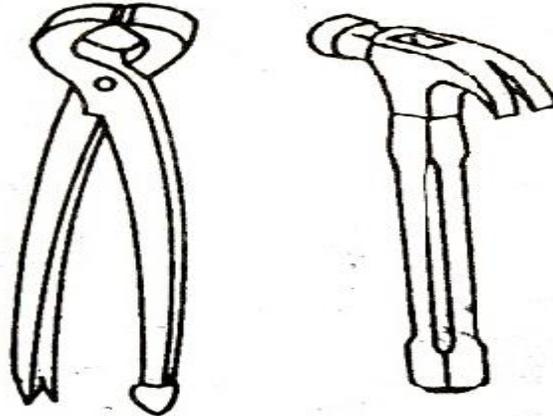
It is used to drive the chisel, when considerable force is to be applied, which may be the case in making deep rough cuts. Steel hammer should not be used for the purpose, as it may damage the chisel handle. Further, for better control, it is better to apply a series of light taps with the mallet rather than a heavy single blow.

2 Pincer

It is made of two forged steel arms with a hinged joint and is used for pulling-out small nails from wood. The inner faces of the pincer jaws are beveled and the outer faces are plain. The end of one arm has a ball and the other has a claw. The beveled jaws and the claw are used for pulling out small nails, pins and screws from the wood.

3 Claw hammer

It has a striking flat face at one end and the claw at the other, as shown in figure. The face is used to drive nails into wood and for other striking purposes and the claw for extracting relatively large nails out of wood. It is made of cast steel and weighs from 0.25 kg to 0.75 kg.



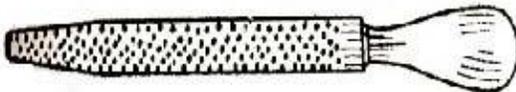
4 Screw driver

It is used for driving screws into wood or unscrewing them. The screw driver of a carpenter is different from the other common types, as shown in figure.

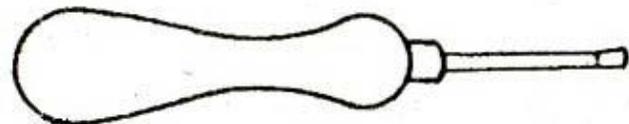
The length of a screw driver is determined by the length of the blade. As the length of the blade increases, the width and thickness of the tip also increase.

5 Wood rasp file

It is a finishing tool used to make the wood surface smooth, remove sharp edges, finish fillets and other interior surfaces. Sharp cutting teeth are provided on its surface for the purpose. This file is exclusively used in wood work.



Wood rasp file



Screw driver

6 Bradawl

It is a hand operated tool, used to bore small holes for starting a screw or large nail.