Woodturning - part 2

Further to our previous bulletin article (273), where we looked at the basic parts of woodturning machines, safety and the tools used, we will now focus on the various ways workpieces are held in the lathe, techniques using some common tools and the process of grinding and sharpening tooling.

Work on the lathe can be divided broadly into either faceplate turning, where material is held in the headstock only end, or turning between centres where the work is held between the head and tailstock. Looking at today's marketplace, you will find a vast range of accessories which provide many useful features to undertake both types of woodturning. However, not all would be deemed essential. Within the school workshop the following would provide a good baseline covering most of the work likely to be undertaken.

Centres

Fork centre
For turning between centres, some form of "prong" centre is required at the headstock end which will engage into the workpiece to prevent it from slipping and transmit a positive drive. It consists of a dead centre surrounded by hardened teeth or forks which bite into the workpiece allowing it to be driven directly by the centre (Figure 1).

Tailstock centre
Often called the "dead" centre, since it does not rotate with the work, the tailstock centre is fitted into the tailstock spindle to support the length of material being turned. As it does not rotate, it is subjected to high temperatures due to friction. For this reason, it is made from hardened steel and greased/ lubricated at the point (Figure 1).

Revolving centre
The revolving centre, which fits into the tailstock spindle, is mounted in a precision ball- bearing. It is often used in place of the dead centre since lubrication is not required between the wood and the cone. This reduces burning and noise as the workpiece spins (Figure 1).

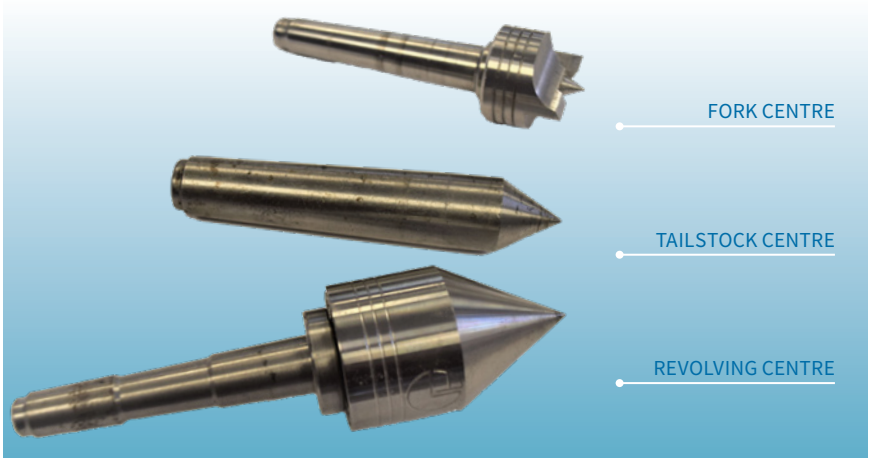

Figure 1 - Centres

Face plates

A face plate is used to secure material to the headstock of the lathe. It consists of a flat metal disc which screws onto the spindle and grips the wood by means of woodscrews passing through fixing holes in the plate. They are available in various sizes from 50 mm diameter upwards. Having multiple face plates means that more than one piece of work can proceed at a time. This is particularly helpful in school workshops. It should be noted that for turning to be carried out on either side >>

of the headstock mandrel then the relevant face plate needs to be used (i.e. left hand thread for fitment to the left of the headstock) (Figure 2).

Chucks

Four Jaw Scroll Chucks
Four Jaw Scroll Chucks allow material to be secured to the lathe quickly and offer flexibility with a range of jaw styles available. The chuck body houses a scroll mechanism operated by a removable key. When the key is inserted into the drive hole on the side of the chuck and rotated, it moves the four accessory mounting jaws either towards or away from the centre. This type of chuck is self centring, meaning all the jaws move together. The back of the chuck housing has a screw thread to match and fit to the lathe. To ensure that the chuck does not work loose, either by centrifugal force or running the lathe in reverse, a grub screw is fitted in the chuck body which can be screwed down to lock the chuck in place.

As mentioned, a variety of jaws are available for different applications. For safety and practical reasons, they should be chosen for the size of the chuck and the type of turning being undertaken. These are fixed onto the mounting jaws using small machine screws. Dovetail Jaws are the most commonly used; they can be used for gripping the workpiece internally or externally (Figure 2).

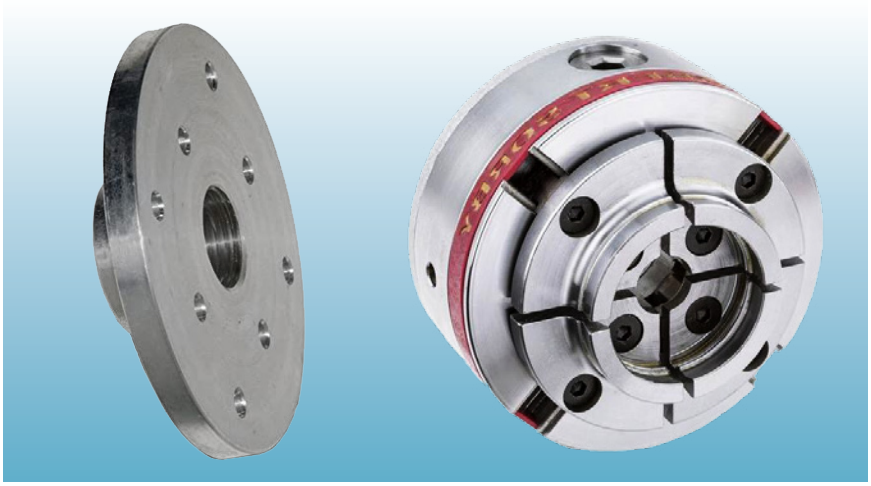

Figure 2 - Face Plate & 4 Jaw Scroll Chuck.

Techniques

Cutting tools
Mastering the techniques of each tool takes practise and time, so any beginner to woodturning should gain some confidence in the basics before tackling major or more elaborate work. Starting with turning between centres would be advisable. Before commencing work, the tool rest must be positioned as close as possible to the workpiece without coming into contact with it. The tool rest height must also be adjusted to ensure the cutting edge of tools are on the centre axis or slightly below (never above).

Starting with a roughing gouge (say 25 mm), lay the tool on the left-hand side of the tool rest, holding it lightly but firmly whilst sloping into the direction of travel. With the machine powered on, place the bevel of the tool on the wood so that it rubs and raise the right hand to bring the cutting edge into contact with the wood. At this point wood should be being removed; the thickness of shaving depends on how much the right hand is raised (Figure 3).

With a light cut, the tool should be passed quickly from left to right; this will bring the timber into a round shape. The surface however will be ribbed and require further smoothing.

To obtain a flat smooth surface a chisel must be used, such as a skew chisel. Again, with the left hand holding the blade and resting on the tool rest, slope the tool in the direction of travel and allow the >>

Figure 3 - Gouge tool position.

Figure 4 - Skew chisel position.

Figure 5 - Scraper position.

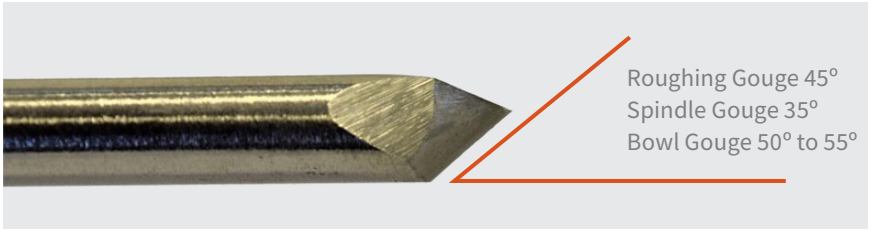

Figure 6

ground bevel to rub the wood. Raise the right hand, the centre of the cutting edge will cut the wood and a steady movement across the rest will produce a perfect surface (Figure 4). When parting off or marking out the same rule applies, allow the bevel to rub the wood and raise the right hand to get the tool to cut.

Scraping tools

Scraping tools require a slightly different technique in that they scrape a shaving, not cut it. This tool generally is easy to use and thus is often used at beginner level. It should be noted that although a scraping tool provides a reasonable level of finish, it will never be as good or smooth as that of a surface cut using cutting tools.

The scraper should be placed on the tool rest, slightly angled toward the direction of travel and held in a more horizontal position. You may find that the scraper cuts better if the handle is slightly tilted upwards, but this movement should not be overdone. The tool rest should be repositioned lower to ensure the top edge of the scraper is on the centre axis of the work piece. If the scraper is tilted too far, it can catch and become jammed between the tool rest and work, resulting in potential injury (Figure 5).

Tool grinding and sharpening

Turning tools should always be kept well sharpened, not only because they will give cleaner cuts, but they will also result in less effort from the individual doing the turning. Unlike regular bench chisels, which have two distinct bevels (a grinding angle and a honing angle), turning tools only have one bevel. A few of the commonly used turning tools found in the school workshop and their associated grinding angles and grinding techniques are outlined below.

It should be noted however, that when using powered grinding machines, the wheel speeds are generally very high and as a result great care is needed to ensure tools do not become overheated. This is obvious when a blue line or mark appears along the edge of the tool and will mean the temper will be lost. To avoid this, the tool being sharpened should be frequently dipped in water.

Gouges

A roughing gouge should be ground to an angle of 45°, a spindle gouge 35° and a bowl gouge between 50° and 55° (Figure 6) with it being held against the wheel, as shown in Figure 7. It should initially be held at a slightly steeper angle than required, then gradually raised until the full bevel comes into contact >>

Figure 7

Figure 8 - Burr removed using a wet/oilstone slip.

Figure 9 - Skew chisel.

with the grinding wheel. It is traversed back and forth across the wheel and at the same time the handle is swung through an arc with a rolling motion so that the whole surface of the bevel is ground evenly.

To finish, the gouge should be honed on a wet/oil stone. With the same motion as grinding, the gouge should be honed until a small burr or wire edge on the inside is achieved. This burr should then be removed using a wet/oilstone slip (Figure 8).

Skew chisel

Skew chisels should be ground flat on both faces, each bevel being 15° to 25° to the side. The tool should be kept moving across the face of the wheel. Honing is done so that the tool is kept at a constant angle and rubbed in a circular motion to keep wear on the stone as even as possible (Figure 9).

Scraper

Scrapping tools should be ground to 80° on one side only. The scraper is not sharpened like normal edge tools, in the sense that when it is ground on the wheel using a side-to-side sweeping motion the cutting edge is formed when a burr or wire edge is formed. It is this burr that gives the tool its scrapping capability and therefore should not be removed (Figure 10).

Parting tool

Parting tools are typically ground to 25° on both sides. With the tool pressed firmly on the tool rest of the grinder and presented at 90° (perpendicular) to the wheel light touch the grinding wheel to grind a single facet bevel on each edge (Figure 11).

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Figure 10 - Scraping tool.

Figure 10 - Parting tool.