

## **Q. A. Sharpening Tools & Cutters for Ornamental Turning**

I would like to use traditional techniques and historic equipment together with modern materials to form and maintain the cutting edges of both hand tools and ornamental cutters.

*Q: Should work on the face of the tool normally be limited to lapping? Is it better to set and lap the edges of cutting tools and the profiles of the form tools which produce beads, hollows and mouldings?? What is the preferred order for these operations?*

**A:** Ideally the bevel on a tool should be dead flat; if sharpened on the edge of a round wheel the bevel will be concave, thus weakening the edge; if, however, sharpened by hand on a flat stone the bevel is most likely to be slightly convex and the cut will not be clean. Referring first to the Hand Tools: they should be sharpened at the correct angle for the material being cut. To obtain a dead flat bevel it is advisable to make a wooden Guide block of the angle required or a 'Quadrant Rest' that can be set to any angle. For Ornamental Cutters a Goniostat is the best tool for obtaining the desired angle.

Holtzapffel recommends they be sharpened to between 25° and 30° but, due to their brittle nature, the same tools when used on hardwoods, should be sharpened less acutely to between 50° and 80°. Modern users of HSS tools usually sharpen them to a much more obtuse angle, as this reduces the chance of chatter. Slide-rest tools are sharpened to a bevel of about 150° for hardwoods and 160° for metal (the directions given can be confusing as sometimes they quote the angle to be ground off, say 30°, and sometimes they quote the angle remaining, say 150°).

For fast grinding a turntable with a horizontal flat revolving disc is ideal, especially if you can use diamond laps or charge a plain lap with diamond paste.

Having sharpened the tool to the desired bevel angle it is then necessary to polish the edge. The conventional method was to lap it first on the oilstone plate, then on the brass plate with emery powder, then on the iron plate with crocus powder; nowadays a much faster result may be achieved by using

diamond laps or diamond paste on flat ceramic laps (materials other than ceramic are soon worn away by the diamond). Grades of 6, 3, 2 microns used in succession give good results, with the finishing polish being obtained with 1 micron paste. Finally the tool should be polished on its cutting face to remove any wire edge. After use when the edge just starts to become dull the final polish can be repeated: increase by 1° or 2° the bevel by adjusting the arc of the Goniostat (or the angle of the quadrant rest). This produces a short bevel that can be sharpened with just one or two strokes on the lap. Of course, repeated polishing of this angle will make the short bevel wider and wider until it becomes more time saving to start again by restoring the whole edge to the original bevel. Each time the bevel is re-polished the cutting face of the tool should also be re-polished. On no account make a bevel on the cutting face as a short-cut to restore the edge on a badly worn tool; the cutting edge must remain dead flat as it would otherwise cut with a negative rake and below height of centre.

*Q: Would it be possible to make lapping plates like those originally supplied but using standard 50 X 80 mm diamond cards of 325, 600 and 1200 grit to replicate the action of natural stone, steel, brass and any associated abrasives?*

*Could diamond paste of six, three and one microns be used as the abrasive and polish?*

**A:** Yes, there is no reason why you should not use diamond cards for quicker sharpening but get the final polish with something like 1 micron paste. The S.O.T. Store did have some syringes of various grades of diamond paste; each holds enough for several life-times of use.

*Q: The transverse holes in the handles which I attributed to Bill Jones' habit of tidiness were presumably for a tommy bar to stop the drill rotating with the work. The size is marked on each tool.*

**A:** Yes, but this was Holtzapffels' idea, not Bill Jones's.

**Q:** *Are 'D' drills started in a shallow recess of the finished size?*

**A:** Yes, then they are either plunged in by hand or guided by slide-rest and tailstock. They are, apparently, one of the best tools for cutting a true hole as they do not tend to wander like a twist drill.

**Q:** *How are the larger drills and other square ended tools held?*

**A:** The chucked drills (Holtzapffel Volume IV figs. 229 - 232) were mounted on the mandrel and used for batch drilling; a very dangerous pursuit where the operator risked impaling his hands and arms on the drill point every time he attempted to drill a hole in the hand-held workpiece!