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# White Paper

## Sharpening Woodworking Edge Tools

This guide is designed to help you select the proper sharpening tools, and to instruct you in their care and use, so that you can look forward to years of satisfying, quality work. Even if you already own a number of sharpening tools, we hope you will find the sections on care and usage helpful, whether you are a professional or a home craftsman.

A truly sharp tool is faster, more accurate, longer lasting, and certainly safer than a dull one, but a surprising number of skilled craftsmen fail to get their tools as sharp as they can (and should). In fact, the money and time you invest in getting your edge tools really sharp—and keeping them that way—will be repaid many times over in work quality and tool longevity. Once the very sharpest edge has been achieved, an occasional honing or stropping will maintain it.

There are a huge variety of sharpening tools available – from power grinders (both vertical and horizontal, both slow and faster speeds), to diamond material, to solid carbide, to natural Arkansas, to water stones from Japan or the USA. Don't be put off by this variety. Educate yourself, be thoughtful, ask for advice and you will develop a path that suits you personally.

Volumes have been written in magazine articles and books on sharpening, and our brief write-up here can only scratch the surface. Nonetheless, we intend that this information to help get you started and give you a general frame of reference for subsequent information gathering or video watching.

### General Sharpening Tips

First of all, make sure that the tools you are sharpening are equal to your efforts. Top quality steel is essential for a true, long lasting edge. An edge of lesser quality material will literally crumble over time in use.

To get an edge tool really sharp, the meeting surfaces must both be honed. With many high-quality tools, this should be done before the first use. Most woodworking edge tools do not come pre-sharpened. (Japanese chisels and plane blades can be an exception and Lie-Nielsen tools are furnished with a good edge. But we recommend that you re-hone all edge tools before first use, even if it is claimed that they are “sharp”.)

Woodworking edge tools all have a basic bevel, usually machine-ground, with serrations in the steel from the grinder. Similarly, the back of the chisel or plane iron will have grinding marks on it. These must be removed to create a perfect edge. If you only hone the bevel of the tool, you will find that the edge still has serrations, because of the

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grind pattern on the back of the tool. When you first get a chisel or plane iron, you must lap the back of the stone or steel plate to get it as flat and as smooth as you can. Water stones are ideal for this, because they cut so quickly. Once the back is flat and polished, turn your attention to the bevel. Most chisels come with a factory bevel angle of 25 degrees. For regular use, these should be honed with a supplementary short bevel at 30 degrees if you are working mostly with hard woods. This strengthens the edge and allows more rapid subsequent honing, because you do not have to work on the entire bevel surface, just a short portion near the edge. After repeated honing, a larger portion of the bevel is at a 30 degree angle. The chisel should then be reground, to restore the basic bevel angle and make honing easier. This also makes the chisel easier to use, since it restores the slim taper to a point, which penetrates wood more easily, since it has less of a wedging action.

Maintaining a bevel is extremely important, and, when doing so, consistency is more important than a particular precise angle. Use a Honing Guide if you feel it will help. There are lots of excellent ones available. Get into the habit of honing with your stone always in the same place, and at the same height from the floor, while making a conscious effort to adopt the same stance and body position each time.

If a cutting tool is poorly sharpened, either from failure to lap the back or from using too coarse a stone, it may cut well initially, but will dull quickly. The small serrations leave a number of sharp but very weak projections on the blade edge. These projections can heat up, lose their temper, and bend, leaving a blunted hook; or they may simply break off because of inherent weakness, leaving a tiny flat spot on the edge. When two smooth surfaces meet, the resulting edge has no weak spots, and any heat generated is dissipated into the main body of the chisel or plane blade (if you doubt that a blade heats up in use, just check your woodworking plane after strenuous planing of hardwood).

Not all edges should be honed at 30 degrees. Proper honing angle depends on intended use, and on the nature of the steel in the blades. For light paring work, it is often useful to have a chisel honed at a low angle of 20 to 25 degrees. The low angle (like a low-angle block plane) minimizes tear-out in cross grain work, and takes less effort to use.

For mortise chisels, the honing angle should be 35 to 40 degrees, depending upon the wood. Hardwoods such as oak put tremendous stress on an edge. If the bevel angle is too shallow, the edge will chip. In softwoods, too blunt a bevel angle can cause excessive fibre crushing and tear-out along the edge of the mortise. A razor-sharp edge allows you to increase the bevel angle and make the tool usable in a range of woods.

Japanese chisels, because they have a very hard layer of steel bonded to a layer of iron, need steeper bevel angles. A Japanese mortise chisel, for example, normally comes with a factory grind of 45 degrees. This should never be reduced, as the steel is simply too brittle to support a shallow bevel (the hard steel, though brittle, takes a better edge, and holds it longer)

Most woodworkers will be well served by just wide, flat bench stones. But because of the shape of carving tool edges, carvers frequently also need to have small shaped stones with curved edges. These are typically called slipstones.

### **Choosing Sharpening Tools:**

#### **Natural & Man-Made Sharpening Stones**

We're frequently asked: "What kind of sharpening stone should I get?" There is, unfortunately, no single right answer to this question; however, we can offer some guidelines. Sharpening is a very individual experience. What works best for one person will not for another. Some woodworkers swear by Honing Guides, others never use them. Some love power grinders. Others dislike them. As we said, there is no right or wrong. Experiment with what works best for you and stick to it.

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It's important to realize that you don't need to cover every category of sharpening tool. But it is a good idea to have at least one coarse cutting stone, to remove a lot of metal very quickly. (A powered grinder can also fill this function.) Such a coarse stone is frequently overlooked in building a selection for a shop. As stone grits get finer, they cut more slowly and leave a sharper edge. You can, therefore, work with just a fine grade stone, though final sharpening will take a lot longer.

But whatever your choice, be sure to use an ample quantity of oil (or water, depending on the stone). The fluid retains ground-up metal chips and bits of stone in slurry that forms part of the cutting action, and eventually carries the particles away, keeping the stone from clogging and becoming glazed. (Once a stone becomes glazed, it loses its effectiveness. Flood the surface with water or oil and rub briskly with a rough cloth until the surface is clean again.)

### **Oil Stones vs Water Stones**

We have a great deal of respect for the traditional oilstones (for example, Arkansas stones), and for the esteem in which they are held. There are also man-made oilstones available, often called "India" stones, typically made by Norton in the USA. However, we have come to believe that water stones, in many respects, offer superior performance and value.

First, a bit of background:

For many years, woodworkers have often used a three stage system with many possible variations. Basic shaping of the tool was done on a hand or power grinder with a coarse stone, either man-made or from natural stone. This was usually followed with a coarse-fine combination stone for refinement of the edge. While some woodworkers stopped there, others used natural oil stones for an even finer finish (soft, hard, and hard black Arkansas stones). Some went further and used a leather strop, with or without various stropping compounds.

Similar steps are still necessary, but the recent development of high-quality man-made water stones has made the process faster and results in better edges. It is still necessary to have a good basic combination stone to repair damage caused by accidents—whether from a dropped chisel or a hidden nail—but all other regular sharpening is best done with these water stones. They cut quickly, and, in our opinion, produce the best edges of any.

The secret to fast cutting action of a water stone lies in the shape of the abrasive particles, and in the nature of the bond between particles. Although the particles are similar in shape to those in natural or man-made oil stones, the bond is much more open. An open (or friable) bond does not restrict the cutting action of the particles, and allows worn particles to be released from the stone constantly, revealing fresh, sharp particles.

### **Care & Use Of Waterstones**

Water stones are softer than oil stones. They wear more quickly, but the sacrifice is well worth the extra cost. They will still last for years and save many hours of sharpening time during their life, but a bit more care is required in their use. A carelessly applied chisel can nick the stone—one or two nicks and you soon learn a compensating technique. (By the way, the use of a honing guide eliminates most of this problem.)

Waterstones need to be soaked before use. Finer stones (6000 & up) require less soaking than coarser grit stones. These finer stones can actually be splashed with water when completely dry, and used immediately. They do not function quite as well this way as when they are soaked, but their rate of water absorption is slow enough to make this an acceptable method.

Waterstones can be stored wet to keep them from drying out. The first reason for this is to have the stone full of water for immediate use when required. Storing in the closed vinyl container or specially fitted box will keep them

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ready for use. Alternately you can keep them in a can of water. Please note, however, that exposure to freezing temperatures will quickly destroy any water-soaked stone.

Because of the generally softer bond, waterstones will, from time to time, need to be flattened. This will be especially true if you sharpen a lot of narrow chisel blades because the wear will cause the surface to gradually become “dished”. But truing a waterstone is easy. Either use a special flattening stone for the purpose or true the stone on a wet piece of silicon carbide paper. Just be sure that the paper is on a flat surface, such as a jointer bed, or a piece of flat glass.

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