A New Angle on Whetstones

Can oil and water be mixed?

by Gerald Polmateer

Oilstones have been the choice of American and European woodworkers for centuries for honing a keen edge on their cutting tools. The only conflict was whether a natural white Arkansas stone produced a sharp enough edge or whether the harder and finer black Arkansas stone was needed. But, about 15 years ago, waterstones began finding their way to this continent from the Far East in quantities large enough to create a new controversy. Although the brouhaha has settled somewhat, many woodworkers are still confused as to which sharpening stones would work best for them. To help resolve the issue, this article takes a look at the care and use of oil and waterstones and the advantages and disadvantages of both.

Whetstones and how they work

The purpose of a whetstone, whether oilstone or waterstone, is to sharpen an edged tool, such as a plane or chisel, by abrasion. When sharpening, you actually grind away the two faces of the blade to make them meet precisely at the cutting edge. The smoother the intersection of these two faces, the sharper and longer lasting the cutting edge will be. The process of obtaining the smoothest edge is much like sanding: You start with a coarse grit to quickly remove excess material and then switch to ever finer grits to refine the surface and remove the larger scratches of the previous grit.

When sharpening, metal particles can quickly fill the pores of the abrasive surface and reduce the cutting action unless they are removed. That's where the oil and water come in. Water and particularly oil are frequently and mistakenly referred to as lubricants. But a lubricant is the last thing you want when trying to abrade a surface. Both the oil and water actually increase the cutting action by holding the metal particles in suspension to prevent them from clogging the surface of the stone.

Waterstones vs. oilstones—*Typical synthetic waterstones are shown in the top row, ranging in grit from 800 to 8,000. Waterstones are fast cutting and leave a finely polished edge. The oilstones in the bottom row include man-made silicon carbide and aluminum oxide stones (left) and natural white and black hard Arkansas stones (right). Natural oilstones are capable of producing razor-sharp edges but are slower cutting than the waterstones.*

Flattening an oilstone *is a difficult task because of the hardness of the stone. It requires lapping the stone on a flat steel plate with a silicon carbide abrasive powder. Because this can be an arduous task, stones should be checked regularly to prevent them from becoming excessively cupped.*

Oilstones

Oilstones are whetstones that use oil to float away the metal particles. Man-made stones generally cut faster than natural stones, but natural stones produce the finest edge. Some of the best natural stones are made of novaculite, which is mined primarily in Arkansas, and hence, they are called Arkansas stones. Arkansas stones are slow cutting and are categorized by name according to coarseness and hardness. Included are the Washita, the coarsest stone, which is comprised of several colors; the soft Arkansas, gray with green specks; the hard white Arkansas; and the hard black Arkansas, sometimes referred to as a surgical stone because of its ability to impart razor-sharp edges to medical instruments (see the photo at left). A stone that performs as well as the black Arkansas is a white translucent Arkansas stone, but this stone costs a great deal more than the very expensive black Arkansas and is even more brittle.

As technology developed, manufactured oilstones became a satisfactory, cheaper alternative. (Although white and black Arkansas stones remain unsurpassed in the field of oilstones for producing a keen edge.) The man-made stones are formed by compressing an abrasive, usually silicon carbide or aluminum oxide, with a bonding agent (such as ceramic, resin, shellac or sodium silicate) into a brick. The bricks are then fired in a kiln at a high temperature.

Silicon carbide and aluminum oxide stones come in three different grits: fine, medium and coarse. Silicon carbide cuts faster than aluminum oxide, but aluminum oxide produces a finer edge.

Storage and care of oilstones—Oilstones should be kept clean and moist. I store mine in a wooden box with a piece of felt under the stone to help keep it moist and a lid on top to protect it from dust. After each use, I wipe off any metal particles and apply a clean coat of oil before shutting it in its box.

To get a true straight edge on your cutting tools, the sharpening stone must be flat. Because oilstones are very hard and wear slowly, their flatness is often taken for granted. But they should be checked periodically and flattened if needed before they become excessively worn.

Flattening excessively worn oilstones is difficult, but the process is easy with regular maintenance. Probably the easiest way to flatten a stone is by lapping it on a flat plate of soft steel or cast iron with a loose abrasive powder or grinding compound. The lapping plate should be thick enough to remain rigid against pressure and large enough to accommodate your largest stone. I use a 3-in.-wide by 14-in.-long piece of ½-in.-thick mild steel that I flattened using a 100-grit sanding belt placed on a tablesaw top. Mounting the plate on a wooden block with a space underneath, as shown in the photo above helps keep the back side from rusting, prevents the base from warping the plate and makes it easy to clean.

To use the lapping plate, spread oil on the surface, sprinkle some silicon carbide abrasive powder on top, and then move the sharpening stone back and forth with a medium amount of pressure, much like sanding a board with a sanding block. Once the stone is flattened, it should be conditioned by rubbing a piece of iron across the stone a few times to return it to its normal coarseness.

The abrasive powder, which is also used for polishing stones, is available from lapidary supply stores in several grits. (It may also be available at auto supply stores as valve grinding compound.) I prefer 90-grit because the particles break down as it's used and effectively act as a finer grit.

Using oilstones—To keep the stone from glazing over or clogging, the proper oil must be used to float the metal particles to the surface. For coarse and medium stones, I use an oil of the consistency of 3-In-One or Smith's honing oil (see the sources of supply box on p. 75). The finer the stone, the lighter the oil I use. For the white and black Arkansas stones, I prefer kerosene, but some people use water. Just a few drops of kerosene spread evenly over the surface of the black stone is enough; the white stone will require a little more.

If your man-made stone seems to continuously absorb oil, it means your stone wasn't filled. Filling is a process of baking in a petroleum jelly-like grease, which makes it easier to keep a coat of oil on the surface of the stone. If your stone isn't filled, you can let it soak in an oil bath until bubbles stop rising from the stone, or you can try baking some petroleum jelly into your stone in your own oven. Immerse the stone in petroleum jelly and then heat it for about an hour at 200 °F. Remove the stone and let it cool. Don't try this with a natural stone because the heat will destroy it.

When the honing oil turns black from metal particles as you sharpen tools, wipe it away and apply fresh oil. When using the finer stones, apply a little less pressure and constantly check for particles because they can chip the finely honed edge.

Waterstones

Waterstones are whetstones that use water to float away the metal particles and also are available in man-made or natural stones. The natural stones usually contain

Photos: Susan Kahn

quartz, sericite and/or volcanic ash that have been compressed over the eons through natural stratification. The natural stones have been mined in Japan for more than 2,000 years and because of the natural compression process, can have varying degrees of hardness within the same stone. These stones have become scarce and thus very expensive.

Synthetic stones were developed less than 100 years ago in response to the shortage of natural stones. The manufacturers of waterstones are more secretive than their oilstone counterparts; therefore, it's hard to determine the exact composition of these stones. They are, however, usually made of silicon carbide or aluminum oxide with various kinds of clay bonding agents. They are pressed into bricks and fired in an oven just as man-made oilstones are. The clay is a softer and looser bonding agent than used in oilstones, so the stone wears away easily. The fast-wearing stone continuously exposes new and sharp abrasive material for fast cutting. This high performance, combined with reasonable cost, makes the synthetic stone a good choice for almost any waterstone application.

Waterstones come in a variety of grits, including very coarse (80- to 220-grit), coarse (600- to 1,200-grit), medium (1,200- to 2,000-grit) and finishing (4,000- to 8,000-grit), as shown in the photo on p. 72.

Storage and care of waterstones—Before use, most waterstones need to be soaked for about 20 minutes or until air bubbles stop rising from the immersed stone. I store most of my synthetic waterstones in plastic containers full of water with lids so that the stones are continuously soaking, as shown in the photo at left. The stones are protected from dust and dirt but ready to use whenever needed. Whether stored in water or dried after each use, waterstones should be protected from freezing, which could split the stone into small pieces.

Storing each grit stone in its own box will keep the grit from a coarser stone from getting on a finishing stone and ruining that finely polished edge you've been honing. If different grit stones are stored in the same container, they should be thoroughly washed before use.

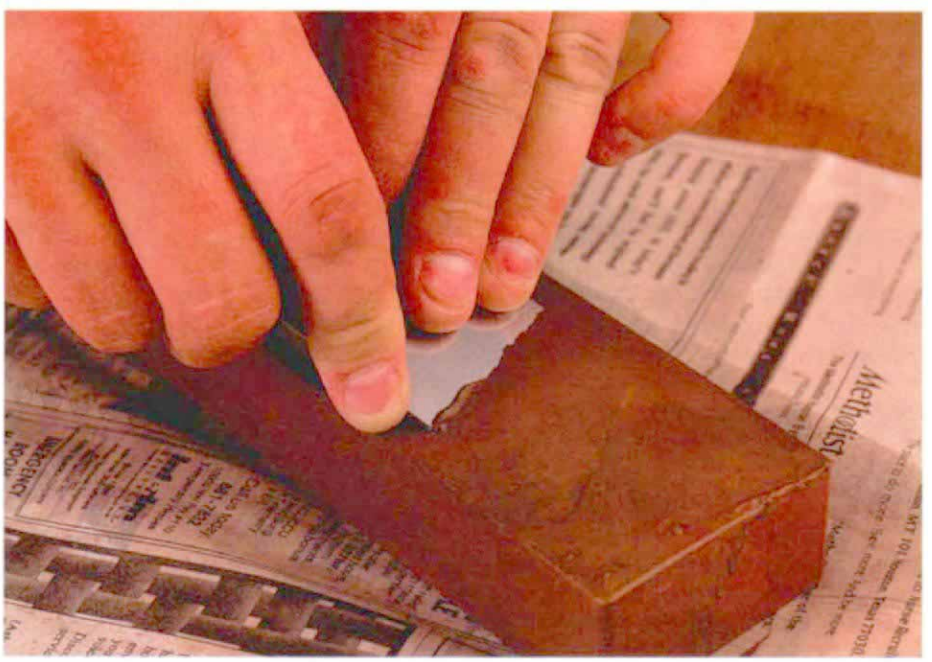
Submerged storage works for all stones except those that are permanently mounted on a base. Generally, only the finishing stones are mounted and these stones can be sprayed with water on the surface as needed during sharpening.

Natural stones should be allowed to dry between uses. Immersing natural stones for long periods of time may cause fractures along naturally occurring fault lines in the stones.

Like oilstones, waterstones also need to be flattened before use. Because waterstones are soft and wear quickly, flattening needs to be done frequently even during sharpening. Unlike oilstones, flattening a waterstone is a relatively easy process. Even badly worn stones can be salvaged by rubbing them on the face of a concrete block using plenty of water. Less severely damaged stones can be flattened with a piece of 220-grit wet-or-dry sandpaper laid on a sheet of glass at least ¼ in. thick. Add a little water, rub the stone across the sandpaper for a couple of strokes and then look at the surface of the stone. The surfaces that are rubbing on the sandpaper will be a different color from the low spots that aren't yet hitting the sandpaper. Keep rubbing until the stone is a uniform color over its entire surface. After flattening, a quick pass or two along the edges will prevent chipping the stone during sharpening.

Waterstones cut quickly *and are great for flattening the backs of plane irons and chisels. Here, the author uses a stick to apply pressure as he flattens a plane iron. Using the side of the stone saves the face for working on the bevel and increases its life. The plastic containers in the background store the stones in water, so they're always ready to use.*

Keep the surface of the waterstone wet *enough to let the tool slide smoothly over the stone. Add more water as the stone starts to dry, but don't wash away the slurry that develops. The slurry speeds the cutting process and helps polish the edge.*



The pros and cons of oilstones and waterstones

Waterstones		Oilstones	
Advantages	**Disadvantages**	**Advantages**	**Disadvantages**
1. Cut very quickly	1. Water can be messy	1. Convenient and ready to use	1. Slow cutting
2. Easy to flatten	2. Water can cause rust	2. Oil won't rust tools	2. Lapping plate must be used to flatten
3. Inexpensive (synthetic)	3. Water evaporates quickly	3. Easily stored in box	3. Expensive (Arkansas stones)
4. Uses cheap and readily available water	4. Soft stone easily damaged by tools	4. Hard and resistant to gouging by tools	4. Oil can stain wood
5. Uniform size and grit (synthetic)	5. Algae can form in water storage tubs	5. Won't freeze	
6. Large sizes available	6. Wears quickly	6. Uniform size and grit	
7. Quickly develops slurry, which aids in honing	7. Must be protected from freezing		

Using waterstones—Before using the stones, you may want to make a base like the one in the top photo on the facing page to hold the stone and prevent it from slipping during sharpening. A wedge holds the stone in the base, making it easy to change stones for a finer grit. Another alternative is a flat piece of plywood or lumber with stops screwed at each end of the stone. Clamping the flat piece to the workbench keeps it from sliding around.

Sharpening with waterstones can be a messy proposition. I protect my benchtop with newspaper, so I can just roll up the mess and throw it away when done.

During sharpening, the surface of the stone should be kept wet enough to keep the tool moving smoothly, but it should not be flooded. Add more water as the stone starts to dry up, but do not wash away the slurry that builds up on the surface of the stone, as shown in the bottom photo on the facing page. The slurry speeds the cutting process.

Check the stone frequently for flatness by rubbing on the wet-or-dry sandpaper and note the high spots. Try to work the tool evenly over the stone to eliminate these high spots.

As with oilstones, start with the coarse grits and work through to the finishing stone to remove the previous grit's scratches. After honing on the finest stone, allow the slurry to dry out, and continue honing. The slurry acts as an even finer grit to further polish the edge.

Alternative sharpening stones

Although water and oil stones are the primary choices for honing cutting edges, there are a couple of other alternatives worth at least a mention: diamond stones and ceramic stones.

Diamond stones aren't really stones. They are a piece of steel with industrial diamond particles bonded to it. The hard diamond particles stay sharp and cut fast, but a diamond stone won't produce a polished finish. Another problem I've encountered with diamond stones is the bases are too flexible. If the sharpening stone is not rigid, it will produce a convex surface on the tool being sharpened.

Ceramic stones are almost as hard as diamonds and resemble conventional whetstones in size and shape. Ceramic stones wear very little, require no honing fluids and clean up easily with water, a scrubbing pad and cleanser. However, for sharpening plane irons and chisels, ceramic stones have a serious flaw: they are not flat and they're almost impossible to flatten by hand. They work great for carving knives and tools where a flat stone is not a prerequisite.

Mixing water and oil

For some reason, people have an either/or attitude about selecting water or oil stones. However, I've had great success using both types. I prefer waterstones when first sharpening a tool because they cut fast. But in the middle of a job, I like the convenience of making a couple of quick passes on my Arkansas stone with just a couple of drops of oil to touch up a dull tool.

Whatever you buy, seek out a reputable supplier and buy good quality stones. I don't recommend stones that share a common oil or water bath because the coarser grit particles always seem to find their way to the finer stones. I like the thicker stones because they remain rigid. The stone should be wide enough to accommodate plane irons and long enough for smooth strokes without worrying about the tool dropping off the end of the stone. I buy l-in.-mick stones that have a 2-in. by 8-in. working surface.

Use the chart above to help weigh the pros and cons of water and oil stones. Keep in mind a dull edge may not be the fault of your sharpening stones or technique. Poor quality tools are difficult to sharpen and won't hold an edge, even if sharpened with the best stones. Buy quality stones and tools; they'll last longer, give better service and you'll never regret it. □

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Sources of supply

Most mail-order companies and even some home centers or hardware stores now offer both oil and water stones. In addition to these sources, the following companies manufacture or supply sharpening products:

Oilstones

Smith Whetstone, Inc., 1700 Sleepy Valley Road, Hot Springs, AR 71901; (800) 221-4156. Catalog available.

Norton Co., 1 New Bond St., Worcester, MA 01606; (508) 795-5000. Catalog available.

Waterstones

The Japan Woodworker, 1731 Clement Ave., Alameda, CA 94501; (800) 537-7820. Catalog available.

Hida Inc., 1333 San Pablo Ave., Berkeley, CA 94702; (800) 443-5512. Catalog available.

Honing oils

3-In-One is available from any hardware store.

Smith's honing oil is available from Smith whetstone, see address above.