

Tip #15 Honing

HONES-CLASSES AND TYPES

Most tools require a razor sharp cutting edge and must be honed after grinding. To do this there are four different classes of hones that you can use: oil stones, water stones, rubber bonded abrasives and diamond hones.

As the names imply, oil stones and water stones are used with liquids. The liquids keep the pores of the hone from filling (loading) up and the surface from glazing over. Plus the combination of metal particles and the abrasive forms a paste (swarf) that actually helps the hone cut faster and smoother.

An important difference between hones is their hardness. The hardness dictates the direction that the cutting edge of a narrow or round tool is moved in relationship to the hone.

Oil Stones

There are many types of oil stones ranging from coarse to ultra-fine. The most common types are: silicon carbide (coarse, medium, and fine), aluminum oxide (coarse and medium), and Arkansas (soft is fine and hard is ultra-fine).

The hard oil stones are usually used by moving the cutting edge of the tools into the stone as if you were trying to cut it.

Silicon Carbide (Carborundum®)-Silicon carbide oil stones are the least expensive of any type of stone. They are dark blue-black in color and relatively soft. They will dish and wear away where used frequently. They are very porous and will soak up a lot of oil when new. They are a good general purpose starter stone that, when taken care of, will last a lifetime.

Aluminum Oxide (India)-The aluminum oxide oil stone is a slightly more expensive type of stone. The coarse stone is black and the medium is a reddish-brown. Both are relatively hard and less likely to wear than the silicon carbide stones. They are porous and will soak up some oil when new. This is a fast cutting stone that is easy to use. They are also good general purpose intermediate stones that, when taken care of, will last a lifetime.

Arkansas-The Arkansas oil stone is an expensive but very high quality type of stone. They are the only natural sharpening stones still mined. The soft Arkansas (fine) is usually white with a slight reddish or grey marbling and the hard Arkansas (ultra-fine) is almost always pure white and sometimes looks translucent. They are very hard and not likely to wear but they are fragile and will shatter like glass when dropped. The hard Arkansas is not porous, however the soft Arkansas is slightly porous and will soak up a small amount of oil when new. These are polishing stones. They are not fast cutting or easy to use, but will produce the sharpest cutting edges of any oil stone. They will, when taken care of, last a lifetime and be able to be passed on to future generations.

The Oil-The oils used with oil stones are as varied as the stones they are used on. Some "highly refined honing oils" are nothing but mineral oil. Others contain "special secret additives" that the manufacturer may claim will make the stone cut faster and keep it cleaner.

All that is really needed is a clean natural petroleum based oil. Avoid food oils like those made from corn, vegetables, or animal fats. They will spoil and become rancid.

Maintenance-Along with using oil to keep the stones clean while honing, they will also need cleaning periodically. All that it takes to clean, even a badly abused stone, is a generous amount of oil. Rub the oil on the surface of the stone with your fingers to float the debris from the pores. Then blot the dirty swarf from the surface of the stone. You will notice an immediate opening of the pores and improved honing surface.

Water Stones

There are two types of water stones: aluminum oxide and "rare earth compound". They come in four different grits ranging from coarse to ultra-fine that are classified like sandpaper: 800, coarse; 1000, medium; 1200, fine; and 6000, ultra-fine.

The softer water stones are usually used by moving the cutting edge into the stone. To avoid gouging a soft water stone, the cutting edges of tools narrower than 1/2", and/or curved tools must be moved away from the stone as if you were trying to smooth it.

Aluminum Oxide-The 800, 1000, and 1200 grit water stones are aluminum oxide. These reddish-brown stones are relatively soft and likely to wear and dish even when used properly. When worn they are easily flattened. They are porous and must be soaked in water overnight when new. They are fast cutting, easy to use general purpose intermediate stones that, when taken care of, will last a lifetime.

Rare Earth Compound-The 6000-grit water stone is made of a "rare earth compound". Exactly which earth compound is considered a trade secret by the makers of this white, very high quality polishing stone. It is porous and must be soaked in water overnight when new. It is slow cutting, but relatively easy to use and will leave a mirror-like surface on the bevel of the tool and the sharpest cutting edge possible. It will, when taken care of, last a lifetime and be able to be passed on to future generations.

The Water-As the name implies, water stones are used with (and in) water. In fact they are best kept and stored submerged in water. The water keeps the stone clean and cutting well. Out of water these stones will only glaze over and almost immediately stop cutting. The water used with these stones is nothing more than distilled water with a drop or two of chlorine bleach added to prevent the growth of bacteria.

Maintenance-The water stone will dish after use even with the best of care. Either after using these stones, or before each use, they should be flattened. Just how soft these stones are will be very evident the first time you flatten one.

To flatten a water stone, lay a sheet of 220-grit wet/dry, silicon carbide sandpaper or a drywailer's sanding screen, on a flat, waterproof surface. A piece of laminate covered sink cutout works well.

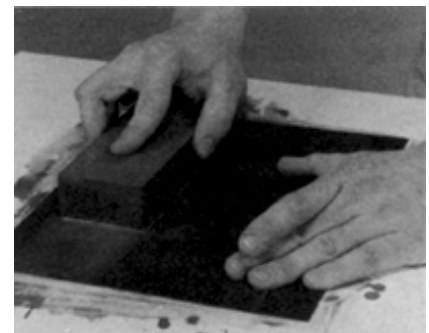


Figure 24-2. To flatten a water stone, use a generous amount of water and rub the stone over wet/dry silicone carbide sandpaper.

Apply a generous amount of water to the abrasive sheet. Place the stone on the sheet and hold it with one hand while rubbing the stone over the abrasive sheet with the other (Figure 24-2). Work the stone until all the gouges are gone. You will find that this process takes only a few minutes.

The last step in this flattening process is to bevel the edges to prevent them from chipping (Figure 24-3).

Rubber Bonded Abrasives

These hand-held or machine mounted hones consist of an abrasive material permanently imbedded in a rubber compound. They may just be the easiest hones of any to take care of because there is no oil or water to slop around, flattening is required only if misused, and they will **not** break if you drop them.

Hand-held rubber bonded hones are used just like the water stones. **Warning: When you are using a machine-mounted rubber bonded abrasive wheel, the cutting edge of the tool must always be pointing away from the direction of rotation. If not, the cutting edge will dig into the soft rubber abrasive wheel and throw the tool from your hands possibly causing personal injury and certainly damaging the tool and the abrasive wheel.**

Maintenance-To store these hones, keep them in a clean, dry place. If a power hone is abused and gouged, accessories known as "dressing sticks" are available to flatten and recondition the surface of the wheel.

Diamond Hones

These hones are made with diamond particles permanently attached to either a metal grid laminated to a plastic base, or a solid metal backing. This flat, rigid backing is necessary for accurate work.

When new the diamond hone will seem very coarse. This is due to the manufacturing processes and will wear away very soon. This is not a wearing out of the hone, but only a revealing of the diamond particles.

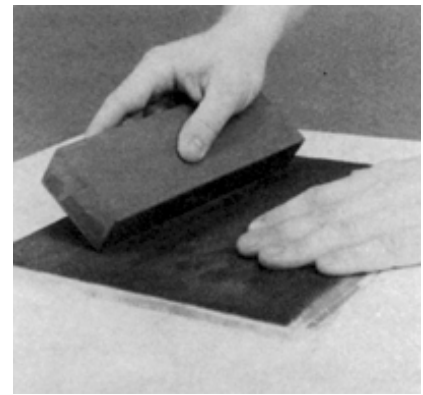


Figure 24-3. After the water stone is flat, bevel the edges as shown.

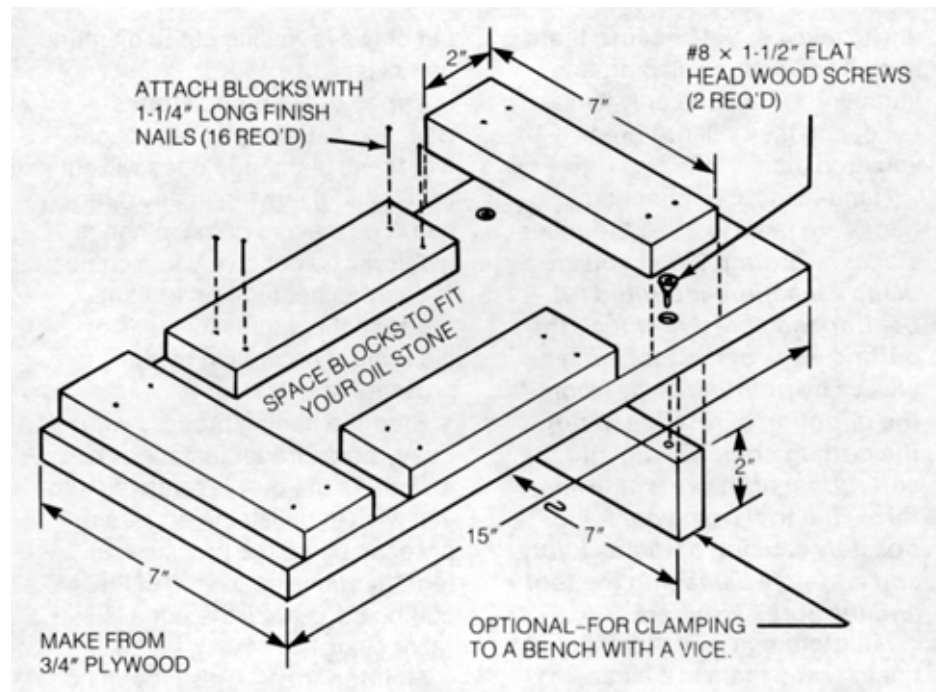


Figure 24-4. Construction details of an oil stone holding fixture that clamps to a bench.

Types of Diamond Hones- Because of the rigid metal backing, these diamond hones will cut with the tool moving in any direction. The makers of these hones generally do not give you a choice of coarse, medium, or fine grit because the aggressiveness of the hone is controlled by the pressure applied to it.

Start the honing process with heavy pressure for fast metal removal. As the burr is removed and you wish to polish the edge, simply ease up on the pressure, alternate from side to side of the cutting edge, until the edge is razor sharp.

Maintenance- This type of hone needs little or no maintenance. The metal backing is slightly magnetic and will attract metal particles which should be wiped away after each use. Left unchecked, these particles will pack between the diamonds and make the hone appear worn out. To remedy this, wash the hone with soap and water, then dry thoroughly. Store diamond hones in their protective covers in a clean dry place.

Securing the Hones

It is very helpful to secure the oil stones and dry hones to a work surface or secure the water stones in the reservoir and the reservoir to a work surface. This allows you to use both hands to control the tool or cutter. You can make a fixture to hold the oil stones or dry hones (Figure 24-4), or a fixture to hold the water stones in the reservoir (Figure 24-5). Then simply hold the fixture or the reservoir between padded vise jaws or bench dogs.

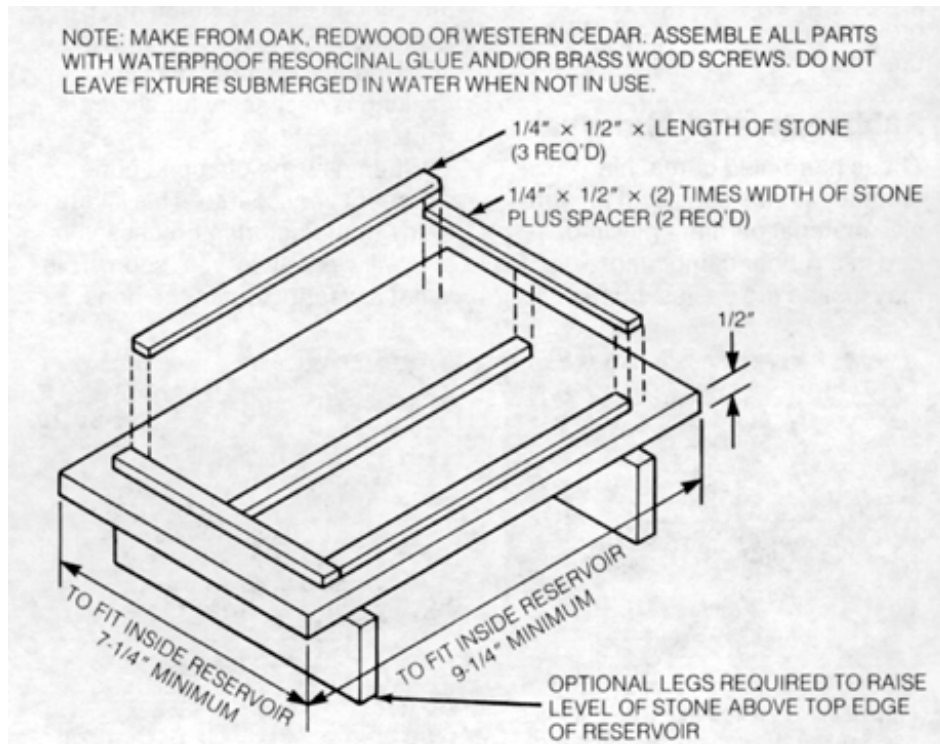


Figure 24-5. Construction details of a water stone holding fixture that sets in the water reservoir.