Slipstones for Honing Moulding Plane Irons

By Bill Anderson

There are 5 general types of slipstones: carborundum, novaculite, waterstones, ceramic, and diamond. Slip stones are shaped in a variety of ways. Generally the most useful ones for molding plane iron purposes have two tapered long edges: one with a tapered curved profile and one with a tapered wedge shaped flat profile. Other shapes include (in cross-section) round rods, triangular or square rods, tapering round rods, and wedge shaped flat stones (narrow on one edge, wider on the opposing long edge, the edges often being rounded). A very useful shape is the tapering cone. This is a cone shape split down the middle. The outside is shaped to a convex curve and the inside is shaped to a similar concave curve. The tapering shape allows one to select a portion of the stone to meet almost any shape of a curves cutting edge presented to it.

Grit can be seen as a somewhat relative term. It has a very specific definition, which is based on the particle size by separate European and American standards. However when comparing different grinding stones, “grit” has a functional definition as well. It is a combination of the hardness of the cutting particles, the size of those particles, the density or concentration of the cutting particles in the matrix, and the relative hardness or density of the matrix. Generally, one is balancing speed of cutting versus ease of maintenance of the cutting surface.

Types of Slipstones

Carborundum. Developed in 1893, this abrasive is basically silicon carbide crystals embedded in a ceramic matrix and shaped to purpose. These stones use an oil of some type as a lubricant to carry away the swarf (a mixture of iron or steel particles, the lubricant, and the degraded grinding matrix). This is a relatively hard medium, cuts quickly and not prone to go out of flatness or shape. The material is however relatively difficult to flatten. The silicon carbide is an aggressive abrasive, so cleanup of the stones in important to prevent carrying particles of a coarse grit throughout the honing process.

Novaculite. There are many natural sources for whetstone material around the world. A very prominent whetstone material is a form of microcrystalline quartz called chert or flint. Deposits of this material found in the Ouachita (Washita) Mountains of Arkansas and Oklahoma and in the Marathon Uplift of Texas have found wide use as honing stones. This material can be graded according to aggressiveness of cut by the fineness of the material and the color of the stones. The stones are termed Arkansas or Washita stones. While Arkansas or Washita stones in general give a finer and slower cut, they are also slow to go out of shape or flatness. Conversely, it is difficult to reshape or flatten this material. In general, these stones use oil as a lubricant.

Waterstones. These are typically silicates (types of quartz) embedded in a clay matrix. The matrix is relatively soft, exposing the cutting particles easily, resulting in a quick cutting material. Waterstones are soft; therefore they can go out of flatness or shape quickly, but are just as easily reshaped or flattened. Waterstones were originally a natural material, mined and shaped to purpose. These sources are rare, and now the commercially available waterstones are for the most part manufactured. These materials generally use water as a lubricant. Waterstones come is a very wide variety of shapes and grits. Green stones are the coarsest, the medium and fine stones are generally brown, and the very fine stones are a light clay color. There are companies (Shapton and Norton) which make a ceramic waterstone, which has a harder matrix, goes out of flat less easily, and does not need to be kept in water during storage. These are often sold as thinner dual surface stones.

Ceramic Stones. The term “ceramic” is a broad term, but in this very narrow instance refers to manufactured sharpening stones made of aluminum oxide abrasive set in a ceramic matrix. These stones are essentially sapphire, and have a very high hardness rating (9 out of 10 on the MOHS scale).The stones do not need a lubricant, which makes then very useful as “touching up” stones on the bench. The stones can cut aggressively, but are generally available in only the finer grits. They stay flat but are difficult to reshape or flatten if needed.

Diamond Stones. Diamond stone are generally made of synthetic diamonds embedded in a steel matrix or in a composite of plastic and metal. Diamond is the hardest material known (10 out of 10 on the MOHS scale). The matrix is not meant to be worn away. The diamond particles do all of the cutting. Generally, the new surface is very aggressive in its cut, but as the stones are used, they “age” and even out in their cut. The diamond stones have the advantage of remaining flat throughout their lifetime, and the cut remains constant. The stones are available in a wide variety of grits. These stoners do need to be maintained, however. The matrix can corrode. One manufacturer provides a powder (a combination of pumice, detergent and antioxidant) to scrub and bleach the surface to remove rust, stain and residue. These stones are readily available as a variety of sizes of flat bench stones and there is also a one shaped stone on the market.

Maintenance of Slipstones

Storage. Most of the stones can be stored dry in a drawer, preferably in a box to prevent dust and debris coating the surfaces. Water stones, especially the coarser grits which soak up water like a sponge, should be store in water but not in a place where the water can freeze. A bit of detergent or Clorox in the water will prevent bacterial growth. The water should be changed on a schedule. The finer grits of waterstones do not take up much water when dry, therefore they can be stored out of the water and simply spritzed in use.
Cleaning. Oil stones (carborundum and natural) stones will eventually fill with debris or swarf. Soaking the stones in light petroleum based solvent such as lamp oil or kerosene will help to pull out the embedded material. Scrub with a stiff wooden bristle brush. Waterstones and ceramic can be cleaned in a water and detergent mixture, with a light scrubbing with a Scotchbrite pad for example. Diamond stones can corrode or rust and fill with debris. A scrubbing with sodium carbonate based cleaners or calcium oxalate or oxalic acid (Bar Keeper’s Friend) will remove stain and rust. Use a wooden scrub brush. Include some pumice as an abrasive.
Flattening. All stones will go out of flatness or shape with extended use. The diamond stones generally stay flat and it is unlikely that you will even need to flatten these. The ceramic stones (aluminum oxide based) also will not go out of flat or shape over time.

The oil stones (carborundum and natural) will go out of flatness gradually. These have a harder matrix, but cut more slowly. A good way to flatten these stones is to work them on a steel plate (generally very flat) with a lubricant composed of light oil and free floating silicon carbide particles. The SiC can be purchased in a variety of grits from machinist supply houses. You may want to start out with a coarse grit for stock removal, followed by a finer grit to finish out the surface, depending on the type of stone and the cut it makes. Make sure to carefully clean the loose grit at each stage to prevent carrying it along. This is a very messy operation, so do it outside on a bench with a layer of newspapers.

Waterstones can be easily shaped in two ways. Pressure sensitive adhesive silicon carbide (SiC) sandpaper can be fixed to a known flat surface (a ½” thick glass plate, or manufactured marble tiles for example). I generally use 100 0r 150 grit papers for this purpose. This is available from Klingspor, and comes in 12” wide rolls). Use water as a lubricant. The operation is messy, so do this outside on a bench. Recently, I have been using an “extra extra coarse” diamond plate stone for this purpose and have been very happy with the results. This is a relatively cleaner operation, and can be done in a cookie sheet on the workbench with a water bottle spritzer.

Comparison of Slipstone Types

type	cutting agent	matrix	cuts	out of flat	grit range	price	shapes	sources (selected)
carborundum	silicon carbide	ceramic	moderate	slow	coarse to medium	cheap	flat, wedge, rods (various cross sections)	Wide variety of sources
natural	quartz		slow	slow	medium to fine	expensive	flat or wedge	www.danswhetstone.com
water	quartz	clay	fast	fast	coarse to fine	moderate	flat, wedge, cone	www.woodcraft.com, www.japanwoodworker.com
ceramic	aluminum oxide	ceramic	slow	no	fine	moderate	Flat, rods (various cross sections)	www.spyderco.com
diamond	diamond	steel	fast	no	coarse to fine	expensive	Flat, tapered round rod, cone	www.dmtsharp.com