Bench Stones

The variables that produce the better edge

The woodworker planning to acquire new sharpening stones for chisels, plane irons, and the like has quite a variety to choose from, and might well ask about the differences among them.

A talk with Jack Heath, an amateur cabinetmaker, and also product manager of abrasive stones for the Norton Company, brings out the key differences.

As Heath sees it, the purpose of the bench stone in woodworking is to remove the ragged burr of metal resulting from the grinding process, and to leave the edge as smooth as possible. Butchers like the sharp, ragged burr because that's what makes a knife cut through meat best, but for woodworkers, the burr merely picks up heat, tears off and leaves an even worse edge. Looked at another way, for hardwoods the smoothness of the edge is more important than the so-called sharpness. Equally important, the finer the edge, the longer it will stay sharp.

So the key properties that a woodworker looks for in a bench stone are the fineness of the edge produced and the resistance of the stone itself to wear. A third property might be the speed with which material is removed—how fast the stone cuts.

These properties are the result of three variables: the size of the particles (or grit) that do the sharpening, the hardness of the particles, and the bonding strength of the stone, that is, how tightly the particles are held together. Particle hardness and bonding strength together determine the hardness of the stone.

Generally, the harder the stone, the slower it will cut, the slower it will wear, and the better edge it will produce, given the same grit size. Of course, the finer the grit size, the finer the edge produced, for a given stone hardness.

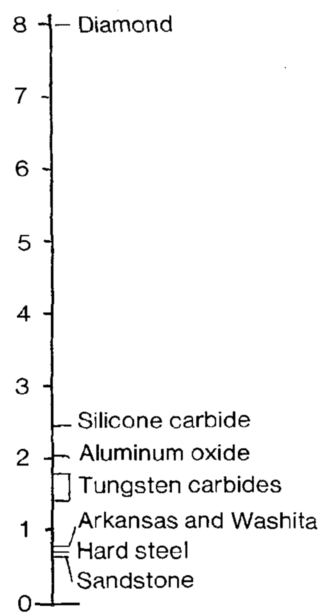
There are two broad categories of stones to choose from: first, natural ones like hard and soft Arkansas (pronounced Arkansas in the trade) and .Washita, a coarser form of Arkansas; secondly, man-made ones of silicon carbide (a black stone sold under the trade names of Crystolon and Carborundum) and of aluminum oxide (a brown stone sold under the trade names of India and Aloxite).

The man-made stones have the hardest particles, but the natural silica stones have finer particles and a higher bonding strength. This combination of finer particles more densely compressed is the reason Arkansas stones produce the finer edge.

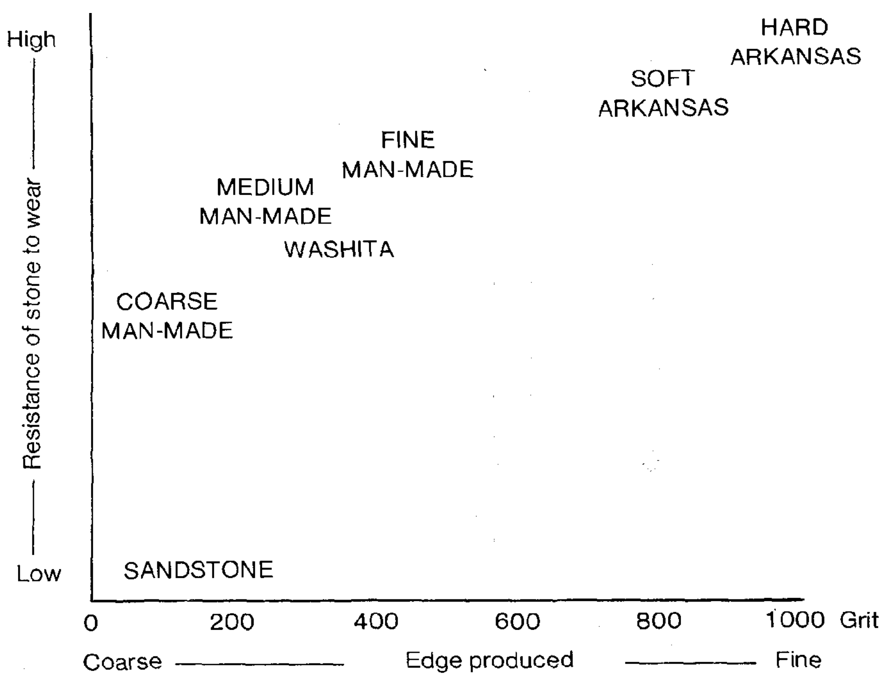
But the finest cutting stones are not the fastest cutting stones, and vice versa. That's why a compromise stone must be picked, or more commonly, two stones used consecutively.

To Heath, the best combination for a woodworker—if cost is somewhat of a factor—is a medium grit man-made stone and a soft Arkansas. If cost is not a factor, then he would use the hard rather than soft Arkansas. Heath

Relative Hardness of Particles



Tool Edge Versus Stone Wear



believes there is a marked difference between the edges produced by fine man-made stones and the natural ones, and would take a blindfold test on *it*.

He can also differentiate between the hard and soft Arkansas just by feeling them. But he's not sure he could tell the difference in cutting ability of a chisel sharpened by a hard or a soft Arkansas. Where the difference would show up, Heath says, is in how long the chisel would stay sharp.

For the cost-conscious woodworker, Heath doesn't believe the relatively slight difference in edge produced between hard and soft Arkansas is worth the extra cost, not if the woodworker has other tools to buy. A hard Arkansas is two to three times the cost of a soft, and is more suited to surgical and engraving tools.

Heath says Arkansas stones are becoming harder to find and notes that the reason hard Arkansas is so expensive is the higher costs of shaping and the low yield from quarry to shipment—on the order of two percent (for soft it's maybe twice that, but still only four or five percent).

So Heath would recommend a natural stone for the final honing process if it can be afforded, but for initial honing he would go for a medium grade man-made.

As to the choice for woodworkers between silicon carbide and aluminum oxide, that's like "tweedledum and tweedledee", because both are standardized in grit size and bonding strength. Where it might make a difference is in particle hardness. The silicon carbide stone will also cut non-metals like glass and ceramics, and tungsten carbide as well. The aluminum oxide will cut these materials, but not as efficiently. So the silicon carbide stone could be more versatile—if that's important.

And of course, for the highly cost-conscious woodworker, who still has many other tools to buy, sticking to a man-made medium/fine combination (half the cost of a soft Arkansas) is the way to go. The main price you pay here is in how often you rehone—not a very great price in the eyes of many woodworkers.

A final note: Heath doesn't recommend a coarse stone at all for fine woodworking tools because he doesn't think anyone should let his edges go so long that they require it.