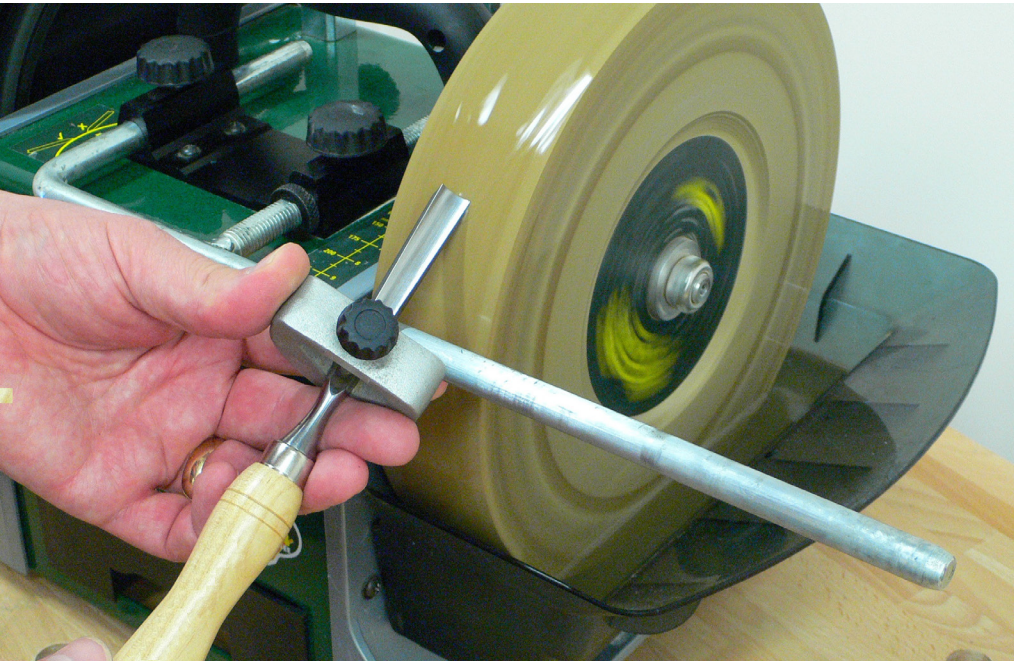


Woodcarving by Numbers

with Mike Davies

Sharpening and Maintenance



Woodcarving by Numbers is a simple to follow programme that guides woodworkers of all skill levels to become competent woodcarvers. Available as a tool and DVD package, simply match your carving tools to the numbered profile chart, and follow the step by step guidance through each project. Watch and learn the Significant Six Carving techniques in the 'Woodcarving Foundation Skills' DVD and work through the various projects, graded in difficulty, designed to put your skills to the test. The ultimate goal is to create designs of your own to add a unique point of difference to your woodworking projects.

Sharpening and Maintenance

Even though many manufacturers of woodcarving tools supply their products ready sharpened, I would recommend that you spend time, right from the very start, learning how to maintain the cutting edge to get the best results from your tools.

If your tools are not razor sharp, this will make learning to carve difficult and frustrating, so I can't stress how important this is for you to master.

To begin, let us consider how carving tools are manufactured. The steel blades of carving tools undergo a heat treating process, called tempering. This process makes them very hard and durable. If the tools are heated excessively during the sharpening process, they may lose their tempered quality and become brittle.

Many woodworkers have grinding machines in their workshops, which are extremely effective at removing metal quickly. The one drawback, however, is that if used incorrectly, they can burn your tools very quickly. Re-grinding your tools is generally a last resort, as the majority of maintenance can be done by 'honing' the cutting edge with bench stones and stropps.

There are many different sharpening systems available on the market, and many will produce razor sharp results. However, regardless of which system you choose, you will need an understanding of the basic sharpening principals.

Sharpening Angles

There are two main angles to consider when sharpening your carving tools. The first is the 'blade angle', which is used to describe the angle of the cutting edge in relation to the centre line of the tool.

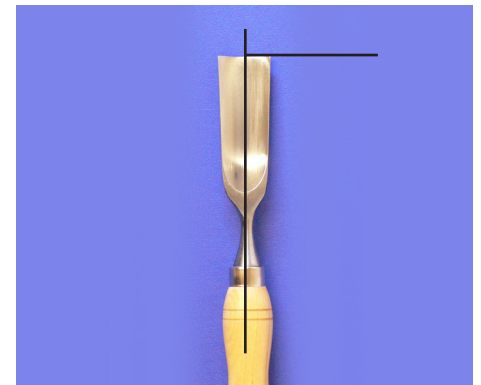


Photo. 1 Blade Angle

In majority it is preferred to keep the blade angle at 90 degrees to the centre line of the tool. The cutting edge needs to be completely flat and the tips of the cutting edge should be intact, not rounded over.

The second angle to consider is the 'cutting edge angle' or 'ground edge angle'. The cutting edge angle of your carving tools will vary anywhere between 20 to 30 degrees. The angle should vary in relation to the density of the timber that you are carving.



Photo. 1 A Cutting Edge Angle

A 20 degree angle will give you a far keener edge, although it will be more susceptible to damage. For smaller finishing tools, or if you carve mostly softwoods, a 20 degree angle would be ideal. If you were to use a mallet to remove large quantities of hardwood, such as Jarrah or Oak, then a greater angle closer to 30 degrees would be required to maintain a functional cutting edge. As a general rule, therefore, the harder the timber, the greater the angle, or for a multipurpose tool aim for 25 degrees.

In Photo 2, 3 & 4 you will find an extreme example of the things that can go wrong with the cutting edge.

There are significant chips along the cutting edge

The tips of the cutting edge are rounded over

The blade angle is no longer at 90 degrees to the centre line of the tool.

The cutting edge angle has become rounded rather than a clean straight angle. This is due to poor honing techniques.



Photo. 2



Photo. 3



Photo. 4

Traditional Sharpening Techniques

On a tool that has been so badly damaged, as pictured in Photo 2,3,4, the only way forward is to regrind the 'Blade angle' and 'Cutting edge angle'.

When using a dry wheeled grinding machine, it is essential to keep the steel cool at all times. This can be done by applying minimal pressure with the blade onto the grind stone. It is also important to dip the tool in water after each pass on the machine. When using a grindstone, always wear eye protection, keep your fingers away from moving components and make sure all loose fitting clothing is tucked away from the machine. Good lighting is also important.

Ensure the grinding wheels on your machine are clean, flat across the face, and running true. Whilst your machine is switched off and unplugged, adjust the tool rest close to the wheel and rotate it by hand to make sure it runs at a consistent distance from the tool rest. If not, the wheel will need dressing.

The first task is to grind the blade angle. The goal is to obtain a perfectly straight line at 90 degrees



Photo. 5

Note in Photo 5 how all chips have been removed, and the tips of the tool are clean and intact. You will also see how a flat has been created along the cutting edge. This is often referred to as a 'flat-line' or 'line-of-light'.

The next task is to create the cutting edge angle. Some carvers make a series of templates to help grind to a precise angle, but the simplest form is to draw several angles on a piece of paper and use this as a guide.



Photo. 6

Use your forefinger and thumb to pinch the blade of the carving tool, so that your forefinger forms a stop against the tool-rest of the grinding machine. The trick is to maintain the same grip on the tool from the start of the grind to the finish. This way

your finger will help to achieve a consistent angle. Remember not to change your grip on the tool when dipping the blade in water. This technique will apply to both flat cutting edge chisels and curved shaped gouges. If you are grinding a curved gouge, then rotate the tool as you pass the blade across the grind stone. The goal is to create a consistent ground edge angle around the circumference of the gouge. Try to avoid grinding numerous flat spots around the edge as illustrated in Photo 7.

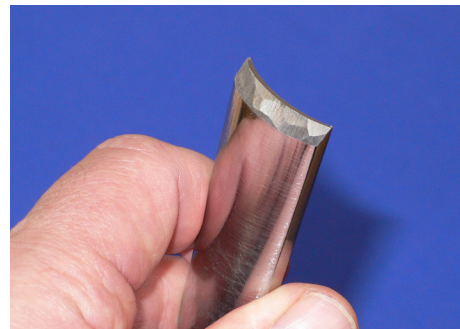


Photo. 7

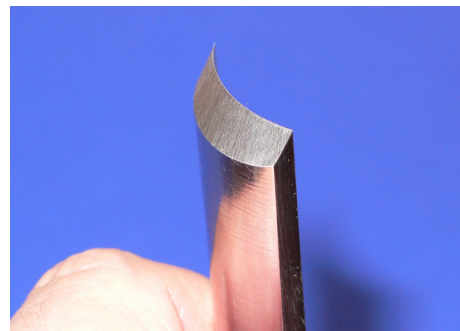


Photo. 8 is the goal.

Continue grinding a consistent angle until you reach the stage where your 'flat line' is almost completely removed. The goal would be to have a consistent flat line that is less than 0.1mm in thickness along the cutting edge. Avoid grinding through the 'flat line', as you will create a tool with a wavy cutting edge.

Honing

Our next step is to hone the blade. There are numerous sharpening stones available; silicone carbide, natural Arkansas stones, and diamond sharpening systems to name but a few. Whichever system is chosen the same techniques will be required.

I recommend having two stones for honing. The first can be used for curved gouges and the second for flat cutting edge chisels.

There are two schools of thought for the honing angle. Many like to slightly increase the honed angle from the ground edge angle. The benefit is that you can be confident about putting the cutting edge in contact with the stone, as opposed to the back edge of the ground angle or 'heal'. The downside is that you can quickly create a convex shape to the ground bevel, requiring a fresh grind. I generally prefer to make the honed angle as close to the ground angle as possible.

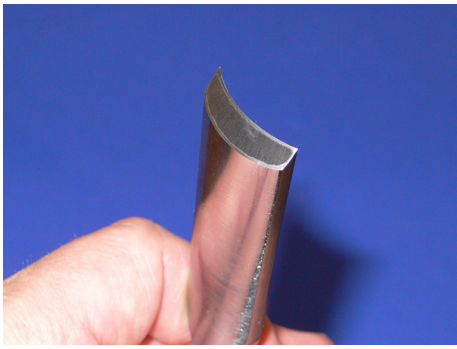


Photo. 9

Honing flat chisels

Position the stone on your workbench with its length running away from you. Add a little oil or water to the surface according to the manufacturer's instructions.

Place the chisel on to the stones surface at the required angle, and slide it back and forth in a continuous motion.



Photo. 10

It is essential that the same angle is maintained throughout this process. Continue until you are able to feel a small ridge of steel that will form on the opposite side of the cutting edge. This is called a 'burr' and needs to be removed using a slip stone.

Honing Curved Cutting Edges

When honing a gouge, fluter or veiner, place the stone horizontally in front of you and add oil or water as appropriate.

Place the gouge at the required angle on the stones surface and slide it from side to side along the stones length. As you slide, rotate the handle of the gouge so that the curvature of the blade receives an even grind. Be careful not to hone away the corners or 'tips' of the cutting edge, which need to be kept at a sharp 90 degree angle to the shank of the tool. (The shank refers to the entire length of steel blade between the handle and the cutting edge). Photos 11,12,13

If the corners become rounded, then it is probably due to the gouge being rotated too far. It may be helpful to practice the sliding motion initially on a flat piece of softwood. When using the stone, continue the process until you can feel the burr on the inside of the gouges curve, opposite the ground edge angle. This should then be removed with a slipstone.



Photo. 11



Photo. 12



Photo. 13

Using a slip stone

Slipstones are used to remove burrs and provide a finer cutting edge. The slipstones should be a finer grade than the bench-stone, and they must fit inside the tool profiles.

Hold the slipstone between your fingertips and thumb and rub the length of the slipstone on the inside contour of the carving tool. The objective is to remove the burr. Some curves like to form an inside bevel, though I prefer to avoid this. Therefore I keep the entire flat face of the slipstone rubbing against the length of the shank.



Photo. 14

After removing the burr, you can use the slipstone to create a finer cutting edge. To do this, simply use the flat side of the slipstone to rub 'up and down' the cutting edge. Be sure to maintain a consistent angle as the honed edge angle. You do not want to round over the sharp cutting edge.



Photo. 15

Stropping the blade

The final process involves a leather strop, similar to a barber would use to refine the edge of a razor.

The leather should be impregnated with a fine abrasive compound, such as Jewellers Rouge. Run the outside and inside faces of the cutting edge down the leather strop to refine a polished cutting edge which should produce razor sharp results.



Photo. 16

Testing the sharpness of your tools

The ultimate test to determine the sharpness of your tools is to use them on a piece of scrapwood. Try sliding the blade through the timber, both with the grain and across it. If you have a razor sharp cutting edge it should glide effortlessly through the timber, like a hot knife through butter. Take a close look at the finished cut. If you have tiny white drag marks in the timber, there is a defect in the blade, which needs to be removed by further work with slipstones or even honing.

The ultimate goal is a polished cut straight from the blade.

Please refer to the Significant Six Techniques tutorial or watch the Foundation Skills DVD for safety and guidance with your techniques.



Photo. 17

The ultimate goal is a polished cut straight from the blade. In Photo 17 you can see two cuts. The first is a polished cut and the second has fine drag marks caused by imperfections in the cutting edge. The tool that created the drag marks will require further work until the cutting edge can produce a clean and polished surface.

The traditional method of sharpening can be viewed on Mike's 'Foundation Skills DVD', which is included along with a workshop booklet in the 12 piece carving tool and DVD set.

Wet stone Sharpening Systems

A wet stone sharpening system is an excellent solution for grinding and honing tools to a razor finish.

A wet stone system carries water to the blade as it is being ground, making it impossible to overheat your tools.

You can produce accurate angles effortlessly, regardless of the shape of tool, using an angle setting gauge.



Photo. 19

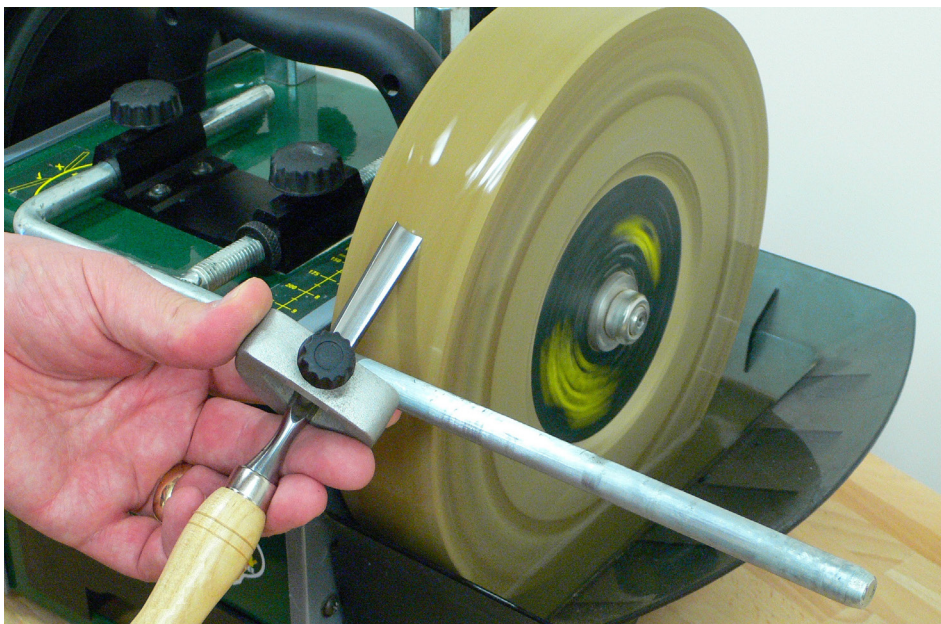


Photo. 20 Gouge Jig

Most wet-stone grinders are available with a host of jigs, but buyer beware. The grade and quality of the stone, jigs, and availability of accessories are an important consideration.

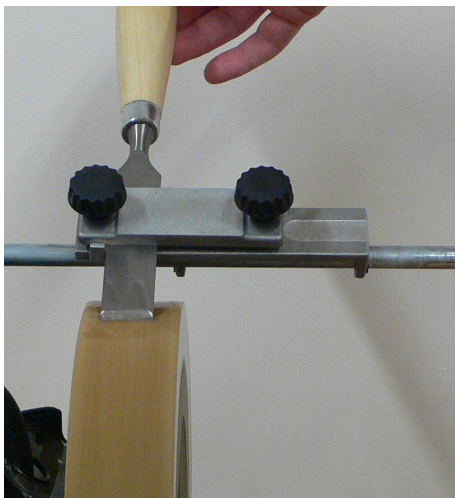


Photo. 21 Straight Edge Jig

Photo 20 Gouge Jig & 21 Straight Edge Jig
Most machines are also fitted with a honing wheel, allowing the same Jigs to be used on the honing wheel directly from the stone. This allows you to ensure the honed edge angle is identical to the ground edge angle. A good quality wet-stone grinding system allows the novice to produce an outstanding mirror finish and a razor sharp cutting edge, quickly and consistently.

About the Author:

Mike Davies is an accomplished craftsman, who has completed projects for royalty, national trusts and private collectors alike.

He has surveyed and restored works by many of the great designers and carvers from the past.

As a qualified teacher, he originally developed his 'Woodcarving by Numbers' educational system in 1994. It was created to help woodworkers of all skill levels to master the art of woodcarving.

Since then, his system has been published in magazines and books. It has been televised and used to teach students in schools and colleges around the world.

The information contained within this document, forms part of a DVD and tool package, which has been developed in cooperation with many of the world's leading carving tool manufacturers.



Important Information and Disclaimers:

learnabout.TV and Mike Davies assume no responsibility or liability for injuries, accidents or damages resulting from the information conveyed herewith. The information or instructions are provided as general guidelines only and demonstrate woodworking activities performed by skilled and experienced craftspeople. These techniques can be dangerous. If you practice them, proceed carefully and at your own risk. The Sweep Profile Reference Chart is provided as a simple referencing system for this series of Woodcarving by Numbers tutorials. It does not refer to references used by the London Pattern Guide, Sheffield List or Continental System.

Please note that due to the printing process there may be variations between the sweep chart and actual tool profiles.