Learn to Sharpen Progressively

By Alan Lacer

This is the first of a two-part article on grinding. The second part—sharpening gouges—will appear in the Winter 2003 issue.

Were these your first experiences in sharpening turning tools?

- You believed the tools came ready to use?
- You thought because the ad said you could turn 4,822 bowls without sharpening, they weren't kidding?
- When you did try grinding, the surfaces looked like a flint-chipped arrowhead?
- In frustration, you went out and spent several hundred dollars for every grinding jig on the market, only to discover they had not reached the level of a pencil sharpener?
- You sent your tools to a sharpening service only to have them sharpened like a saw blade?

Don't be too bashful in grinding tools. You really can't hurt them— you only shorten them.

Sharpening takes some knocks because some turners see it as a task or chore to be endured and not as a skill—just like turning—that will take time to learn. The good news is that sharpening is closely related to the skill of woodturning.

At one time every conceivable woodworker learned sharpening skills as part of their activity—whether it be sharpening saw blades, axes, spokeshaves, chisels, or plane irons. Today however, few cabinet or furnituremakers sharpen circular or bandsaw blades, planer and joiner knives, router bits or shaper cutters—either these are throwaways or cutting tools sent to specialty shops. Even the other domain where sharpening was essential to learn—that of carving—has often been replaced by spinning bits and cutters that require no sharpening, just replacement. Alas, the poor woodturner still must learn to sharpen. However, there are numerous benefits from learning this skill.

Here's how sharpening skills mimic woodturning: You take a turning tool and place it on a tool rest, it meets a round object approaching the edge, and you manipulate the cutting edge. Sounds like what we do as turners, right? Learn the skill to sharpen and you are learning turning—and vice versa.

If sharpening frustrates you, you may need to adopt a tried and true learning strategy: a progression from simple and relatively easy activities to something difficult and more complex. If you think about it, this is how most skills are acquired. If you take up playing the fiddle, you don't start with the Brahm's violin concerto as your first task. You probably start with playing notes, then scales, *Yankee Doodle*, and finally progress in difficulty at the rate of your learning. The same path that works for learning math, cooking, computers, golf, drawing, driving, and sailing holds true of sharpening turning tools.

The good news to all of this is that learning those simple tasks first has several benefits: Most of those tasks are also foundational—not just easy—and will be the basis for learning the more difficult maneuvers.

I wonder how many folks have quit woodturning over the years because they either could not sharpen the tools or found they spent more time sanding than turning? So, if you are early on in your career as a turner or you are still frustrated about this sharpening thing, join me and try this progressive order of learning to sharpening your tools.

To begin with, you can't shape and sharpen your tools by hand.

Working with dull tools is like trying to drive your car with flat tires— it just isn't very satisfying.

We can certainly hone the tools by hand—but honing only keeps a sharp tool sharp or regains a small loss of keenness on a cutting-type turning tool.

No, power equipment is the order of the day for a host of reasons, not the least of which is the type of tool steels used today. Most turning tools currently being sold are not just higher heat-working steels but also higher wear-resistant steels. Your grandpappy's Arkansas oil stone is going to have a tough go on a Glaser V-15 tool or on most of the English, Canadian, and Australian tools now on the market. And the fact that too many tools need major reshaping from their new condition, we will need some power assistance to do the job.

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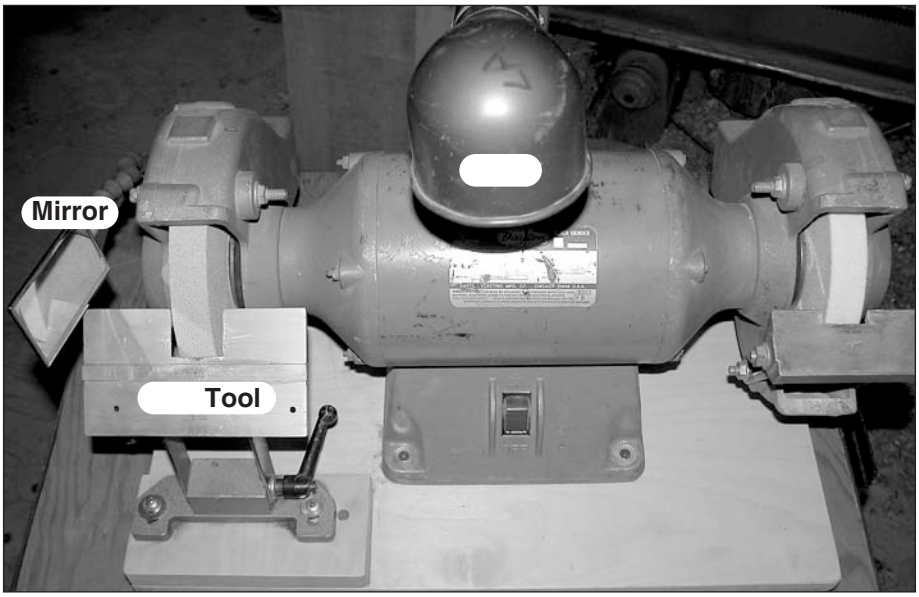
Buying your grinder and wheels

I find that it is not as simple as "anything will work" for a grinder. If you have a 3600 rpm grinder with a 120-grit gray wheel, 1/2" wide and worn down to 4" in diameter—it will be tough sledding. Nor do I find the slow speed water grinders to be my first choice for a grinder. Ditto for a belt or disc sander either. At least 90 percent of the turners I know worldwide use a wheel grinder—and for good reason.

Here's my grinder preference: an 8" dry wheel grinder, with either variable speed or a fixed rate of 1725 (or 1800), a rock-solid tool rest system, and at least one decent wheel. The 8" wheel offers a lot over smaller and larger wheels: the 8" has 25 percent more surface area than a 6" wheel per revolution. This translates to greater efficiency, cooler grinding, and a much longer wear period before replacement. The 10" and greater diameter wheels leave too little of a hollow-grind for me—and I use the concave surface as a two-point honing jig (see Spring 2002 article).

I prefer the dry wheel as the action is towards me—this allows me to determine a lot of things from the spark trail: where I am grinding, the degree of grinding, and when to stop grinding (sparks just trail over the top of the tool). With a water-type grinder, the action is away from me and there is no longer a spark trail. Those grinders are fantastic for carbon-steel tools like plane irons, cabinet makers chisels, scissors and the like—but not a first choice with most turners. I like the slower 1725 speed for a grinder. As I aim to remove minimal material, the 1725 speed grinder has a cooler action, and I just find it a more gentle action than a 3600 rpm screamer (those seem to double my mistakes!). We are now seeing two-speed grinders and infinitely adjustable grinders on the market, which will probably be common with most grinders at some point.



Strong and sturdy tools rests, good lighting, solid mounting and at least one good wheel are minimal requirements for a reliable grinder. The tool rest on the left is an after-market rest. A supporting strap was added to the right rest for increased rigidity.

If the tool rest assembly is flimsy, I cannot consistently grind my tools nor is it really safe to do so. Place your thumb in the center of the tool rest of your grinder and push down. You should feel virtually zero give—if it feels springy, improve or replace. You can add extra support strapping, build a wooden rest, or purchase one of several after-market accessory rests. Also, the rest should be adjustable both in angle and the ability to slide towards the stone to accommodate for wear as well as keeping the rest close to the stone for safety purposes. Finally, a light is a worthwhile accessory to the grinder if one did not come attached to it.

Thoughts on grinding wheels and dressers

First, work with the widest wheel you can fit to your grinder. In most cases this is 3/4" or 1"—but the wider the better. Next, throw away your gray wheels. Spend a lot or spend a little, but acquire at least one decent grinding wheel to sharpen with.

The wheels I would suggest are friable aluminum oxide—now in patriotic colors of red (okay, often pink), white, and blue. The word "friable" refers to the ability of the stone to fracture, exposing fresh grinding surfaces as you use it. Gray wheels usually are not very friable, the cutting particles

round over, thus reducing grinding ability and often glazing and generating considerable heat. The color code of these wheels makes them easy to spot. However, there really is a difference between a $10 wheel and $100 wheel.

My advice: If you have an 8" grinder look for wheels that sell for between $25 and $55 and you'll be fine. Two other critical aspects of the wheels: grit size and hardness. I like to work with two different grits on my grinder. For initial shaping of a tool or any other heavy grinding operation, I rely on a 36- or 46-grit wheel. For the actual process of sharpening an edge, I prefer either a 60- (the new 54-grits are close enough) or 80-grit. My ideal setup is a 60-grit on the left side of my grinder (I am right handed; reverse this if you are a lefty) and a 36-grit on the other side.

And finally, how hard should the stone be? Most stones—but not some of the real cheapies—indicate the hardness as shown in the photo *below*. This makes a difference in its friable quality and how well it performs on

Profile the tool first, then pull a bevel up to meet that profile

tougher steels. Stone hardness follows the alphabet scale from soft to hard as you go down the alphabet. Most of the stones commonly found range from H through K. My first choice is a J followed by the K.

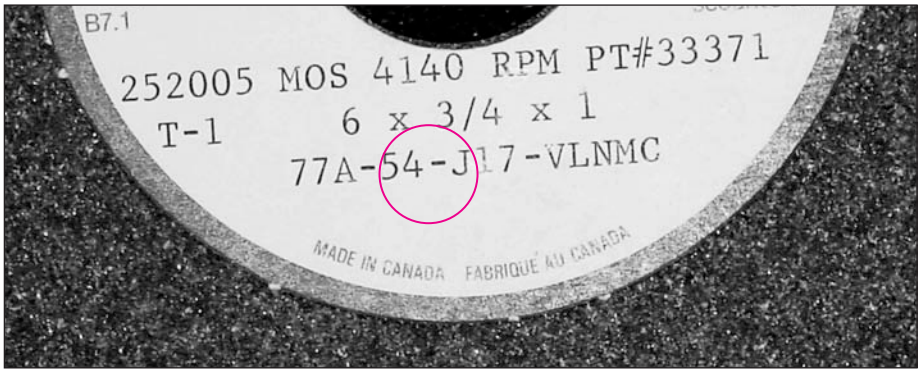
Almost as critical as a good stone is a dresser. These are tools that perform a number of functions: true the wheel to the axis of your grinder, flatten the face of the wheel, remove the buildup of metal particles, and expose or sharpen the abrasive particles. There are several choices: star-wheel, gray dressing stick, boron carbide stick, and diamond. I prefer the multiple diamond dresser (not a single point) in a round or tee shape. Keep it by the grinder, and use it lightly but frequently.

Finally, deal with the hazards associated with tool grinding. One of the greatest hazards is to protect yourself from flying particles, whether they are grit from the wheel or pieces of steel removed in the grinding process. The plastic shields on most grinders are worthless to see through after a short time—a full face shield is my first choice followed by goggles. Only use a grinder with metal shrouds to contain the wheel just in case it shatters into pieces.

Another serious hazard is the dust produced from grinding. I like to think of it as ground up glass. I know of no turners who use a wet dust collecting system to direct the grinding dust into—but this is more common with jewelers and other metal workers. And, of course, don't direct the dust into your normal wood dust collecting system—think of the drama of sparks and wood dust meeting!

What is most common is to wear a quality respirator, one rated for small particulate matter. And finally, keep the pinch and crush factor to a minimum by always working with the tool rest as close to the wheel as possible.

Wheel dresser examples left to right: gray dressing stick, tee diamond, round diamond, star-wheel. In the foreground is a boron carbide stick.



It is challenging to look at a wheel and guess its grit size and hardness. Most stones have a code—in this case, the bottom row of numbers.The most important codes to a turner are circled.The "54" designates grit size; "J" indicates the hardness designation.

Continued

Order of learning

From my own learning and watching hundreds of students try to learn the sharpening process, I recommend learning the turning tools in this order:

1. **SCRAPERS**
   (all shapes, but not including profile scrapers)
2. **PARTING TOOLS**
3. **SKEW CHISELS**

We'll cover the above tools in this issue.

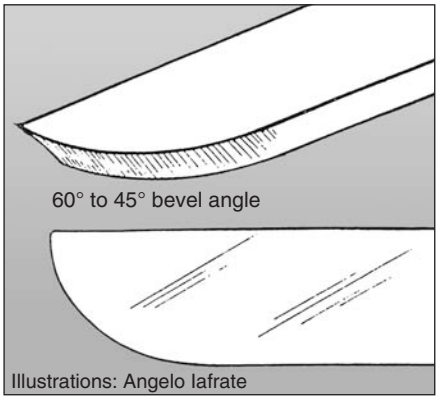
4. **ROUGHING GOUGES**
5. **DETAIL GOUGES**
6. **BOWL GOUGES**

We'll cover gouges in the Winter 2003 issue.

1. Sharpening scrapers

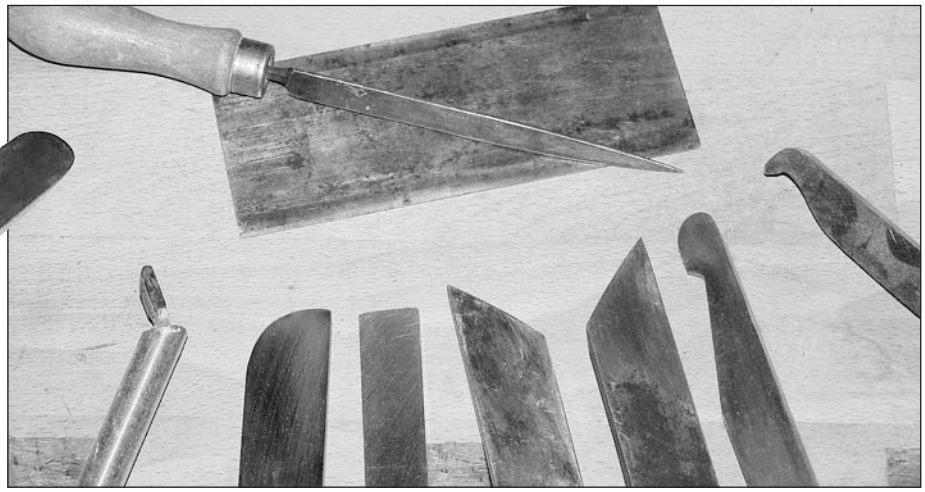
These are tools, of almost any shape, that are intended primarily to cut with a burr and not rub the bevel on the wood. Yes, I know we violate both of those guidelines from time to time, but that does not help someone who is starting out. Of all the turning tools, scrapers are some of the most straightforward to sharpen. Few turners struggle with these tools in getting the basic process, and we don't have to be too fussy about shapes, angles, and multi facets on the ground face.

The first rule of sharpen-ing turning tools: Profile the tool first, then pull a bevel up to meet that profile. For a scraper, personal preference determines the shape. You will probably discover that the slight dome on a new "round nose" scraper you just bought isn't very rounded. You may even find you don't use one side of the rounded end, so it may take on the shape of a side-ground scraper. Whatever the specific need or your style of turning, shape the tool first.



One version of a side-cutting scraper

Next, rough in the bevel angle. When most of these tools are new, I find the bevel to be 80 to even 90 degrees below the cutting edge. I believe manufacturers started with the notion that a scraper


Woodturning scraping tools are quite similar to the cabinetmaker's scrapers (background, shown with a burnisher). Both types of scrapers usually cut with a burr and both can make use of a burnisher to raise that burr. Turning scrapers are thicker and heavier in weight and come (or can be made into) in an array of shapes for specific purposes.

needs a lot of support under the edge since you don't have the secondary fulcrum of a bevel-rubbing tool to add extra support (your tool rest is the primary fulcrum). Unless your scrapers are 1/8" thick, this is a bad notion.

As a matter of fact, if I am using the tool at a scraping angle (with no bevel support) and the bevel inadvertently touches the wood, I can get a catch. I treat the bevels on scrapers as clearance angles, so mine are ground between 45 to 60 degrees. I also don't have to worry about single facets and a hollow grind on the ground bevel: I don't hone the bevel on these tools so it is not as critical as it is with other turning tools. However, grinding uniform bevels on these tools is great practice for all the tools to follow.

The process for sharpening is straightforward. After profiling, proceed to grind the bevel to match the profile. If you need some assistance early on in sharpening, set the tool rest angle to that 45- to 60-degree window. Start at the back of the bevel, keeping the tool flat on the rest, and progress along the cutting edge until sparks just come over the top. I don't look for a heavy stream of sparks, but consistent "tracer bullets" that tell me I have reached the cutting surface.

Being a scraper, the raised burr will be my cutting edge at least 90 percent of the time. I can use the burr right off of the grinder (useful if heavy stock removal is called for) or remove that burr with a flat stone and pull up a new burr with a cabinetmaker's burnisher or the honing stone.

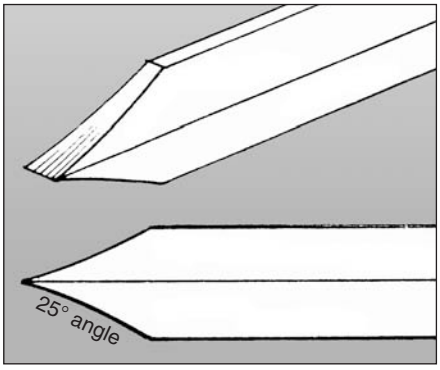
By using one of the other methods, I find it easier to produce different types of burrs—some for heavy work, some for fine finishing work. In those cases where the burr is too aggressive for a particular piece of wood (you may feel it "picking" at the wood rather than a smooth leveling action), try scraping with a sharp edge—produced by grinding--then removing the burr on top with a flat honing stone. This is similar to the action of scraping with the edge of a knife or the furnituremaker scraping the top of a table with a large piece of broken glass. When you work a sharp edge in a scraping action, it may quickly dull the edge. However for that window of doing fine scraping, it may be just the ticket.

Sharpening the cutting tools

Now we come to the tools that start to cause problems for beginners. These are tools that will cut with a keen edge and, in most cases, presented at a cutting angle with the bevel rubbing on the wood. Now we become fussy about angles, uniformly ground bevels, and of course, keen edges.

2. Parting tools

There are several variations of this tool, but the most common is a rectangular section of steel with the cutting edge in the middle that's ground on both sides. This is a great tool to learn cutting tool sharpening as it has a relatively small area to grind (the edge is usually no greater than 1/4") and the edge is in a flat plane.



Diamond-section parting tool (profile and angles same as rectangular tool)

For profiling, make sure the edge is ground straight across, and the included angles of the ground bevels are around 25 degrees. Fortunately, new parting tools most often arrive profiled in an acceptable manner—not sharp mind you, but routinely shaped fine. To sharpen, either set the tool rest at the approximate angle desired, use the edge of the rest as a steady, or use your fingers to adjust the angle.

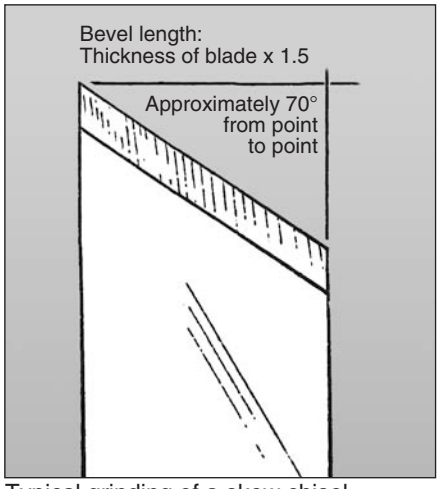
Start at the back of the bevel (called the "heel"), keep the edge horizontal, and lap from side to side on the wheel until you just see sparks trailing over the top of the cutting edge. Flip over the tool and repeat the same procedure on the other side. The objective is to produce a single facet with a slight hollow grind. If your movements are controlled and steady, this all happens. If jerky, uneven, inconsistent, too much pressure, "grind and look" and "grind and look," then things probably won't be so good.

Continued

Go slow, be deliberate, leave the tool on the wheel, and use only enough pressure as it takes to keep the tool from bouncing on the rest. I am always surprised how much of grinding and turning is really about feeling your way along rather than seeing.

In grinding, most of the action is on the other side of what you can see. We can help the looking part along—especially when learning the process—by placing our head to the side of the grinder or by the use of a mirror (attributed to a North Carolina turner). In time, most of your grinding will be by feel and watching the spark trail to give the additional feedback.

Until you have a sense of where you are grinding on the tool, it's helpful to either place your head to the side of the wheel or make use of a small mirror. The mirror, shown above, allows you to see your placement of the tool on the wheel.

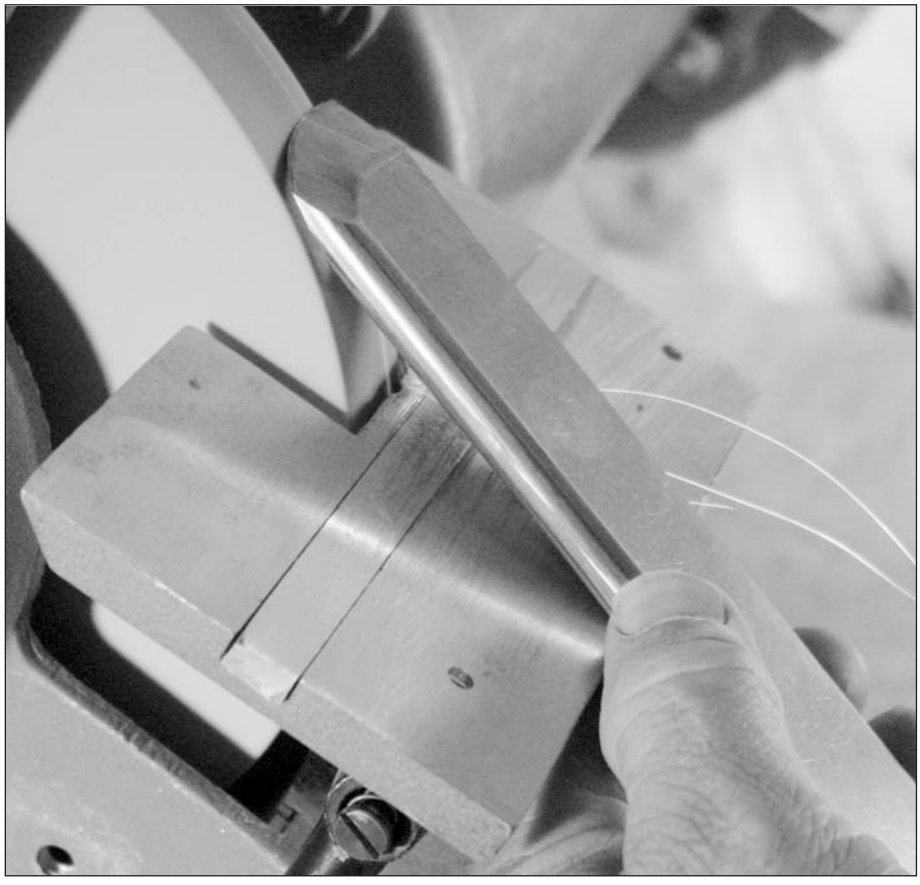


Typical grinding of a skew chisel

3. Skew chisels

Fortunately, the sharpening of a skew chisel is similar to the parting tool: two ground flat planes that meet to form a cutting edge. The only real difference is in the skewed angle of the cutting end—essentially a clearing and viewing advantage over a square-across chisel.

Again, profile the tool first. For a "traditional" straight-edged skew, I recommend 70 degrees from point to point. Rather than measuring included angles to measure the steepness of the two ground bevels, I use the thickness of the steel as the reference. Using this method, grind the bevels back to approximately 1.5 times the thickness of the blade.



Using the back edge of the tool rest, pivot the curved skew to grind the edge. Using a rotational movement, grind in the area that is roughly parallel to the face of the wheel.

If you can see the edge, there is no edge.

Grind the bevel and not the edge.

For the sharpening process, follow these steps: Keep the edge horizontal and parallel to the face of the wheel, start at the heel and lap back and forth. Continue this process until sparks just trail over the edge. Flip over the tool and repeat the same procedure.

If you have an "oval style" skew (my last choice for a skew) you will find it wants to wobble rather than remain in a flat plane. In that case, maintain pressure in the center of the tool with a thumb to essentially lock it into a fixed plane. As an alternative, investigate a grinding jig that locks the darn thing in place.

If you are grinding a curved-edged skew, simply grind the edge while it is generally parallel to the face of the wheel. This will require a rotational motion that follows the curve of the edge. If the skew plagues you with multiple facets, go ahead and set the tool rest to the suggested bevel angle. Keep the tool flat on the rest and follow the above strategies. I have had good success just using the front or back edge of the tool rest as a point to slide along for a straight skew or to pivot on while grinding a curved edge.

Tests for sharpness of cutting tools

If you can see the edge, there is no edge. Short of turning, this is the best test I know. Use an incandescent light to check for any reflection along the edge; a sharp edge disappears into a black line. Dull spots will reflect light.

What comes off the tool, dust or curls? Even in dry material, a sharp tool forms a longer chip or ribbon, dull tools produce dust or very short chips.

How much effort does it require to remove the material? Unless you are roughing out a large piece, a sharp tool presented at the right angle is almost effortless; a dull tool requires more force.

What does the cutting action sound like? A sharp tool makes a sound reminiscent of a sharp hand plane; the dull tool sounds flat or makes a scraping sound.

How clean is the surface when you stop the lathe for inspection? Sometimes it is a difficult piece of wood, but generally a sharp tool gives far superior results to the surface of the wood.

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Notes on overheating the tool

By now you may have come up against the problem of bluing the grinding surface of the tool. If you have high-carbon steel tools, you have a problem: the steel has now been re-tempered to a hardness that is too soft to hold an edge for woodturning. If you have high-speed or high-heat-working tool steel—no problem. But how do you know what kind of steel?

Generally the high-carbon tool steels produce a complex, white, bursting spark when placed on the grinding wheel. The high-speed steels tend to have individual, orange sparks. Often the manufacturer stamps the handle or steel itself with "HSS" or "High Speed Steel." I have found some inexpensive imported tools stamped with those designations, but sparked like high carbon tools—so be careful.

Here are some suggestions regarding overheating. First, learn to grind with a lightness of hand and movement of tool that does not overwork an area, thereby reducing heat. Second, use friable wheels (see page 54) that grind cooler, and dress the wheel often. If you have carbon steel tools—and some of my old favorites are of that steel—quench in water frequently for heavy grinding or delicate points of skew chisels.

If you have high-speed tools, don't quench in water: the effect may be too shocking for the steel and possibly produce small fractures at the cutting edge. The high-speed steels easily handle temperatures of 700 to 1000 degrees F with no loss of hardness (bluing is around 580 degrees F). If the high-speed tools get too hot to handle (during heavy grinding), I just place them on a large metal heat sink like a lathe bed and take a short break. The best rule for all steels is learn to work without generating a lot of excessive heat and eliminate the need for quenching.