Learn to Sharpen Progressively

By Alan Lacer

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American Association of Wo

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

Were these your first experiences in sharpening turning tools?

- You believed the tools cam ready to use?
- You thought because the ac said you could turn 4,822 b without sharpening, they weren't kidding?
- When you did try grinding the surfaces looked like a fl chipped arrowhead?
- In frustration, you went ou spent several hundred doll for every grinding jig on th market, only to discover th had not reached the level o 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.

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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 Even the other domain where sharpening was essential to learn—that of carving—has often been replaced by spinning bits and cutters that require no sharpening, just replacement.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 wi
dull tools i
like trying
drive your c
with flat
tires—
it just isn't
very satisfyi

We can certainly hone the too
hand—but honing only keep
sharp tool sharp or regains a
loss of keenness on a cutting
turning tool.

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

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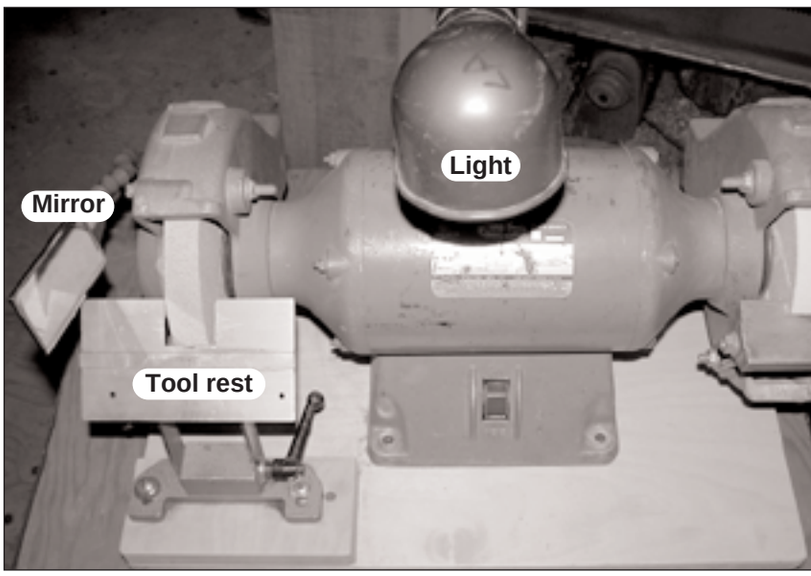
Buying your grinder and wheels

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 goo wheel are minimal requirements for a reliable grinder. The tool rest on the left is after-market rest. A supporting strap was added to the right rest for increased rig

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 we keeping the rest close to the for safety purposes. Finally, a light is a worthwhile accesso the grinder if one did not co attached to it.

Thoughts on grindin wheels and dresser

First, work with the widest w you can fit to your grinder. I most cases this is 3/4" or 1"— the wider the better. Next, th away your gray wheels. Spe lot or spend a little, but acqu least one decent grinding wh to sharpen with.

The wheels I would sugge are friable aluminum oxide— in patriotic colors of red (oka often pink), white, and blue. word "friable" refers to the a of the stone to fracture, expo fresh grinding surfaces as yo it. Gray wheels usually are n very friable, the cutting parti

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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.

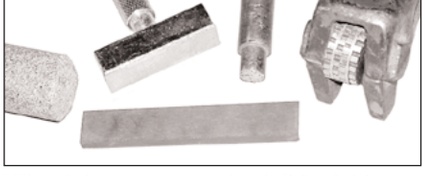
Almost as critical as a good stone is a dresser. These are tools that perform a number of functions: true the wheel to the axis of your grinder, flatten the face of the wheel, remove the buildup of metal particles, and expose or sharpen the abrasive particles. There are several choices: star-wheel, gray 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 pro
The plastic shields on most
grinders are worthless to see
through after a short time—a
face shield is my first choice
followed by goggles. Only us
grinder with metal shrouds t
contain the wheel just in case
shatters into pieces.

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

What is most common is t
wear a quality respirator, one
rated for small particulate m
And finally, keep the pinch a
crush factor to a minimum b
always working with the too
as close to the wheel as possi



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 st
have a code—in this case, the bottom row of numbers.The most important code
turner are circled.The "54" designates grit size; "J" indicates the hardness desig

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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.

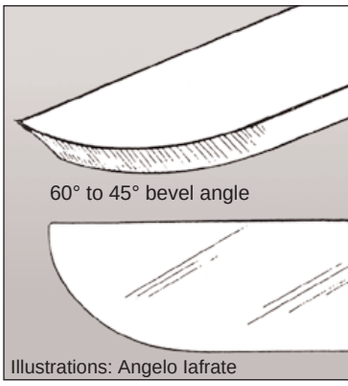
4. **ROUGHING GOUGES**
5. **DETAIL GOUGES**
6. **BOWL GOUGES**

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 sharpening 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



Illustrations: Angelo Iafrate

One version of a side-cutting scrap

rounded. You may even find don't use one side of the rou end, so it may take on the sh of a side-ground scraper. Whatever the specific need o your style of turning, shape tool first.

Next, rough in the bevel a When most of these tools are I find the bevel to be 80 to ev degrees below the cutting ed believe manufacturers starte with the notion that a scrape needs a lot of support under

g scraping tools are quite similar to the cabinetmaker's scrapers l, shown with a burnisher). Both types of scrapers usually cut with a n make use of a burnisher to raise that burr. Turning scrapers are th in weight and come (or can be made into) in an array of shapes for oses.

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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.

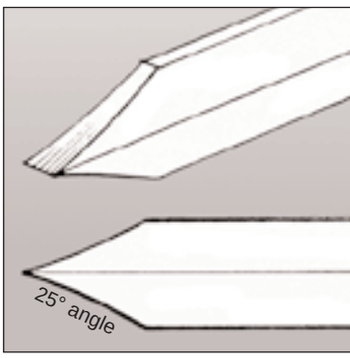
By using one of the other methods, I find it easier to produce different types of burrs—some for heavy work, some for fine finishing work. In those cases where the burr is too aggressive for a particular piece of wood (you may feel it "picking" at the wood rather than a smooth leveling action), try scraping 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



Diamond-section parting tool (prof
angles same as rectangular tool)

has a relatively small area to
grind (the edge is usually no
greater than 1/4") and the edg
is in a flat plane.

For profiling, make sure th
edge is ground straight acros
and the included angles of th
ground bevels are around 25
degrees. Fortunately, new pa
tools most often arrive profil
an acceptable manner—not s
mind you, but routinely shap
fine. To sharpen, either set th
rest at the approximate angle
desired, use the edge of the r
a steady, or use your fingers
adjust the angle.

Start at the back of the bev
(called the "heel"), keep the e
horizontal, and lap from side
side on the wheel until you ju
see sparks trailing over the to
the cutting edge. Flip over th
and repeat the same procedu
the other side. The objective
produce a single facet with a
slight hollow grind. If your
movements are controlled ar
steady, this all happens. If jer
uneven, inconsistent, too mu
pressure, "grind and look" ar
"grind and look," then thing
probably won't be so good.

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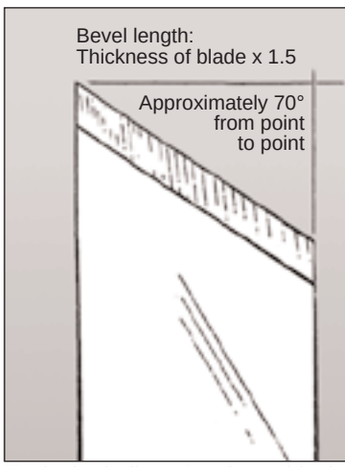
Go slow, be deliberate, leave the tool on the wheel, and use only enough pressure as it takes to keep the tool from bouncing on the rest. I am always surprised how much of grinding and turning is really about feeling your way along rather than seeing.

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. Us
rotational movement, grind in the area that is roughly parallel to the face of the w

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

Grind the bevel and not the edge.

sing a
wheel.

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 acti sound like? A sharp tool mak sound reminiscent of a sharp hand plane; the dull tool sou flat or makes a scraping sour

How clean is the surface w you stop the lathe for inspect Sometimes it is a difficult pie wood, but generally a sharp gives far superior results to t 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) tha grind cooler, and dress the whe often. If you have carbon steel tools—and some of my old favorites are of that steel—quen in water frequently for heavy grinding or delicate points of skew chisels.

If you have high-speed tools don't quench in water: the effe may be too shocking for the ste and possibly produce small fractures at the cutting edge. The high-speed steels easily handle temperatures of 700 to 1 degrees F with no loss of hardn (bluing is around 580 degrees F If the high-speed tools get too h to handle (during heavy grindi I just place them on a large met heat sink like a lathe bed and take a short break. The best rul for all steels is learn to work without generating a lot of excessive heat and eliminate the need for quenching.