Most people don’t realize they might need specialized grinder wheels when they begin their adventure with woodturning. The first thing they think of is usually a lathe. Next, turning tools and wood. Maybe sharpening enters into the process at some point, but grinder wheels? Nobody thinks of them.

Having proper wheels on your grinder makes woodturning simpler and more pleasant than struggling to sharpen tools with improper equipment. Quality wheels that are balanced and suitable for your needs will make sharpening easy. Sharp tools make turning fun.

The old pros can sharpen successfully with just about any grinder and grinder wheel. They probably don’t even use a jig to hold the tool at the proper angle. Decades of practice make it easy for them to roll the tool over the grinder wheel by hand and get a perfect edge, whether it is an old gray grinder wheel or the latest ceramic ones.

The rest of us, however, appreciate all the help we can get. When we are starting, it is particularly important to simplify the process and have the most appropriate equipment.

I spent more than a decade as a production turner and used a wide variety of grinder wheels. I have tested all the popular types—and some not so popular. Some wheels work quite well, but I have a cabinet full of wheels that do not. Now I want to share those experiences with you.

**Grinder size and speed**

I have used 6” and 8” (15 cm and 20 cm) grinders both high and low speed. Which is best? Probably the one you have. The main difference between the 6” and 8” grinder wheels is the amount of use you get out of them. When a 6” wheel gets down to 5” (13 cm), I generally change the wheel. But I use an 8” wheel until it is about 6”, which is a substantial amount of extra grinding. Yes, it costs more to begin with, but you quickly recoup the extra cost. Is it worth buying a new grinder, though? Probably not, unless you are in continual production mode.

More important than the wheel size is the speed of the grinder. There are high-speed (3450 rpm) and low-speed (1725 rpm) grinders. Low-speed grinders are increasingly popular with woodturners because of the lack of heat buildup during use. At a lower speed, there is less chance of bluing—heating the metal to a blue color. In the old days, this was considered a terrible thing to do, with good reason. The carbon-steel tools—all we had until the last twenty years—lose their temper if the metal turns blue from heat buildup when grinding. The tools would not hold an edge and had to be ground back significantly to get rid of the soft metal, wasting metal and grinding grit.

The newer high-speed and powdered-metal tools are much less susceptible to overheating, but it can still happen, especially if you put some pressure on the tool and take it beyond the blue stage. Many people recommend dunking a tool in cool water to keep the heat level down. I have done this and seemed to get away with it; however, it can lead to microscopic cracks in the sharp edge. It is better to use a light touch when sharpening a tool to avoid heat in the first place.

If you have a high-speed grinder, there are wheels made specifically for them. One way Mfg., for example, sells wheels recommended for use with high-speed grinders. These wheels tend to be harder than the low-speed ones, so don’t mix them up. Personally, I prefer the lower-speed wheels because I tend to grind off less of my tool at each sharpening.

**Dressing the wheel**

Speed is not the only thing that causes heat. A dull wheel is a major culprit. Dress your wheel as soon as it is not cutting efficiently. When the abrasive particle contacting the steel is sharp, a metal shaving is milled from...
my grinding jig had to be constantly readjusted in order to maintain the same angles on my tools.

Blue wheels
After white wheels came blue wheels, which are still popular. They are harder, but not hard enough to cause major problems with overheating the steel. They sharpen tools quickly and easily. They are great workhorses and last longer. I continue to use them. They are a great compromise for light use on hard metals.

Wheel grit
All these wheels are made from aluminum oxide, the workhorse of the metal industry, and they are relatively inexpensive and do a good job. The blue wheels are the wheels beginners will probably like best. I keep an 80-grit wheel on one side of a grinder and 120 grit on the other side, the first for shaping tools, and the second for creating a fine edge. The edge produced by the 120 grit is sharper than that produced by the 80 grit. It looks almost like a honed edge, yet the edge will not break off the high-speed tools we use, as it used to with carbon-steel tools.

Gray wheels
Three aluminum oxide wheels are currently available. The gray one on the left came on a new grinder and is meant for grinding soft steel. The white wheel in the center was also on the grinder and is a little too coarse for woodturners’ sharpening needs, but would be suitable for major reshaping of a tool. The blue stone is distributed by Oneway Mfg. and is a type that is designed for woodturners’ needs. Note: it is rated for 4,140 rpm, so is meant for a high-speed grinder. Stones are also made specifically for slow-speed grinders.

Gray wheels
As I mentioned, those who have been turning for quite some time can do a good job of sharpening using the hard gray wheels that normally come with a grinder. For many of these turners, this was all they had, so they learned to live with the grinder wheel’s limitations. Gray wheels are designed to stand up to the terrible punishment associated with metalworking shops where thick steel plate is ground, bolts shortened, and other heavy-duty jobs performed. Heavy pressure is usually put on the wheel and the metals are soft. Gray wheels are very hard, so they can do these jobs while lasting a reasonable length of time. They also tend to heat up the metal, which is not a problem in most applications.

We woodturners, however, are performing a light-duty job on very hard tempered steel—simply renewing an edge on an already sharpened tool. The tool’s hardness and the resulting heat are our enemy. Gray wheels tend to glaze over easily and stop cutting efficiently. When that happens, the normal reaction is to press harder, increasing the heat. If you have to use a gray wheel, clean it often and use a light touch when grinding.

White wheels
White wheels became popular about twenty years ago. They were considered a solution to all of our sharpening problems. And, to a certain extent, they were. They were soft and did not burn hard steel tools as readily. (Most were about an H grade.) The softer the wheel, the less heat buildup.

There was a downside, however. It was easy to wear a groove in a white wheel. As a result, more time was spent dressing the wheels to get rid of grooves, causing most of the wheel to be ground away by the dresser, removing ripples and grooves on the face of the wheel, white powder piling up. The wheels did not last long but did a good job of sharpening. Another problem was that with the quick wear, wheel and ejected. This removes a significant amount of generated heat in a spray of red sparks. A wheel with dull grit ploughs across the steel and transfers much of the heat to the steel. Hard wheels are particularly prone to getting dull.

Ceramic wheels
There are new and interesting wheels on the market. The ones made from a ceramic alumina compound are better than the regular aluminum oxide wheels. The grit on these wheels is not made from your granny’s ground-up teapot, even though it is called a ceramic. Each manufacturer closely guards exactly how it produces the material, but basically, the manufacturer converts a colloidal dispersion of hydrosol containing goethite into
Three diamond wheels. On the left is the wheel with \( \frac{3}{8} \) (3 mm) of diamond/nickel on the rim. The polished spots caused by sharpening high-speed steel are visible. In the center is an unused resin-bonded wheel and on the right (diamond plated) is the one I found most suited to my needs. It started out as an 80-grit wheel and after a year, I am using it as a fine-honing wheel. Note that there is no identification on the two wheels on the right.

A major reason why these wheels work so well is that the grits are microcrystalline. This means that each piece of grit is composed of a clump of hundreds of tiny sharp crystals. They continually break away as they are used, exposing millions of fresh sharp cutting edges. These wheels cut cool and leave a fine finish on the tool bevel. By comparison, each piece of aluminum oxide grit is one crystal, which may or may not fracture under pressure and break down to expose smaller edges as they wear. Blunt abrasives rub, which overheat tools.

Ceramic wheels are expensive, but they produce a wonderful edge. I find that when sharpening with 80 grit, the edge looks almost like it was sharpened with a 120-grit wheel. (The finest wheel I can find in ceramic is 80.) They grind almost twice as fast as aluminum oxide (so use a light touch) and produce a keen edge. The wheel self-sharpens as it grinds, it wears slowly, and requires minimal dressing. They can last five times longer than a white wheel, so they are cost-effective.

Because the ceramic is expensive to produce, it is mixed with regular aluminum oxide before being pressed into a wheel. The wheels I am referring to are 50% ceramic, such as the Norton SG wheels sold by many suppliers. Norton also manufactures a wheel that has only a 30% ceramic content, the 3X. While these cut cleanly and run cool, some people have found the wheel wears faster than they would like. Some who have had problems say their wheel has a bond hardness of I. Mine has a bond hardness of K, and has not been a problem. To me, they are good value for money, however, the SG, with its higher ceramic content is well worth the added expense.

**Diamond wheels**

Some woodturners use diamond wheels. The theory seems to be that diamond can cut anything. In theory, it does. It is great for cutting ceramics, stone, and aluminum. But diamond wheels do not cut steel efficiently. All the manufacturers agree it should not be used to sharpen the steel we woodturners use—in fact, anything with iron in it. On metals with a ferrous content, the diamond literally disappears. Diamond particles have a fatal attraction to the iron in the steel. The iron attracts away the carbon in the diamond one atom at a time. The two actually bond at the molecular level, which means a minute amount of the diamond gets carried away with the chip. It sounds like a slow process, and at room temperature it is—thus hand-held diamond honing stones last a long time. Start adding heat, however, and the process speeds up dramatically and catastrophically and you will find a mist of black dust around the base of your grinder, all that is left of your precious diamonds. If you put much pressure on your tool—pushing it into the diamond—you can go through the diamond layer in minutes. If you are gentle, you can get a year or so out of a diamond wheel in use daily, but it will slowly change from an 80-grit wheel to a 120-grit wheel, and eventually will only be good to use as a hone.

I have tried several brands of electroplated diamond wheels, as well as resin-impregnated ones, and an expensive wheel with \( \frac{3}{8} \) (3 mm) of diamond embedded in nickel around the rim. They all behaved the same way: The diamond quickly wore down to a finer grit and some wheels seemed to need a lot of dressing.

Cleaning them with an old aluminum oxide wheel can restore diamond wheels. That worked on all wheels I tried, but I was reluctant to use the aluminum oxide on the electroplated wheel—there is only one layer of diamond. In fact, that wheel needed less attention than the other types—just cleaning with WD40.

The wheel with the diamond/nickel mixture wore away the old aluminum oxide grinder wheel faster than my daughter’s large cat inhales food. It looked great and cut well after this treatment. What happens is that the aluminum oxide wears away the bonding agent in the diamond wheels, exposing more of the diamond. If I sharpened a few \( \frac{3}{8} \) (16 mm) gouges on the wheel, however, the surface seemed to deteriorate into a finer grit and the nickel became highly polished. It always looked like it needed cleaning. I eventually took that wheel off the grinder and will give it to a stone carver. That is a $400 loss.

The resin-bonded wheel also lost its edge quickly, but would clean up well.
end mills and other precision machining
distinctively-profiled wheels to sharpen
required. Aircraft manufacturers use
precise sharpening and shaping is
dramatically the need for sanding.

To summarize, the electroplated
wheels caused the least amount of
trouble. It took about a year to perma-
nently wear them down from 80-grit
to honing-wheel condition. The elec-
troplated and resin-coated wheels cost
more than $200 apiece, so I do not
consider them cost effective.

CBN wheels
Manufacturers recommend wheels
made of CBN—not diamond—for
sharpening tool steel. CBN is cubic
boron nitride and it is almost as hard
a diamond—it will actually scratch
diamond. And, it does not have the
fatal attraction that diamond has for
iron. I have had a pair of these wheels
on a grinder for over a year now and
can detect no wear. Of course they will
ever get smaller, I get the

CBN grinder wheels come in almost
any shape desired. The choice is
endless . . . except for simple bench
grinder wheels. (The shape of a stan-
dard bench grinder wheel is generally
called 1A1 for diamond/CBN.) Bench
grinder wheels are available, but you
have to search for them. Check with
your local metalworking shops.

I intend for this brief survey of
grinder wheels to accomplish three
objectives. First, to provide informa-
tion to help you buy grinder wheels
with more confidence. Second, to
make your turning experience more
pleasurable. And third, to help you
save money—I know—I have spent far
too much on grinder wheels over the
years. It is my own fault, of course, but
I am too curious for my own good!

Bill Neddow spends his retirement creating
bowls for galleries and taking part in studio
tours. He also does some demonstrating.
Bill considers himself a semiproduction
turner, following themes in his bowl
designs, but trying something different
with each one. He is fascinated not only by
how to do something but why it works, a
byproduct of thirty years as a writer, editor,
and publications manager. He lives in
Ottawa, Canada, with his wife and about
3,500 dry rough-turned bowls. His website
is billneddow.com. You can email him at
bill.neddow@sympatico.ca.

CBN bench grinder wheels (6" by ½" [150 mm by 20 mm] only) are available in Britain from Peter
Child Woodturning Supplies.

In North America, they are harder to find. Dave Schweitzer of D-way tools just started carrying
CBN wheels. Another source is the one I found after searching for six months—the supplier was in
my own backyard! Cuttermasters (800-417-2171 or cuttermasters.com) has both 6" and 8" (15 cm
and 20 cm) wheels in a variety of grits and they ship worldwide. One major woodturning supplier
is actively searching for a good source, but there has been no announcement yet.

Another source is Northwest Super Abrasives in Eugene, OR (541-683-0801). Reed Gray (robo
hippy) provided this source. Reed is an active and knowledgeable contributor to woodturning
forums. Reed adds, “My 80-grit (CBN) wheel is four-plus years old and until last year, I was turning
maybe 800 bowls per year, along with other things. It might be halfway used up. That amount of
sharpening would have worn out at least one standard grinder wheel per year.”

I have tried getting the wheels from the salesmen for all the big name companies, including Norton
and 3M. They all say they can deliver, but not one has called back. These companies produce CBN
wheels, but it appears that bench-size grinder wheels are not part of their regular production lines.