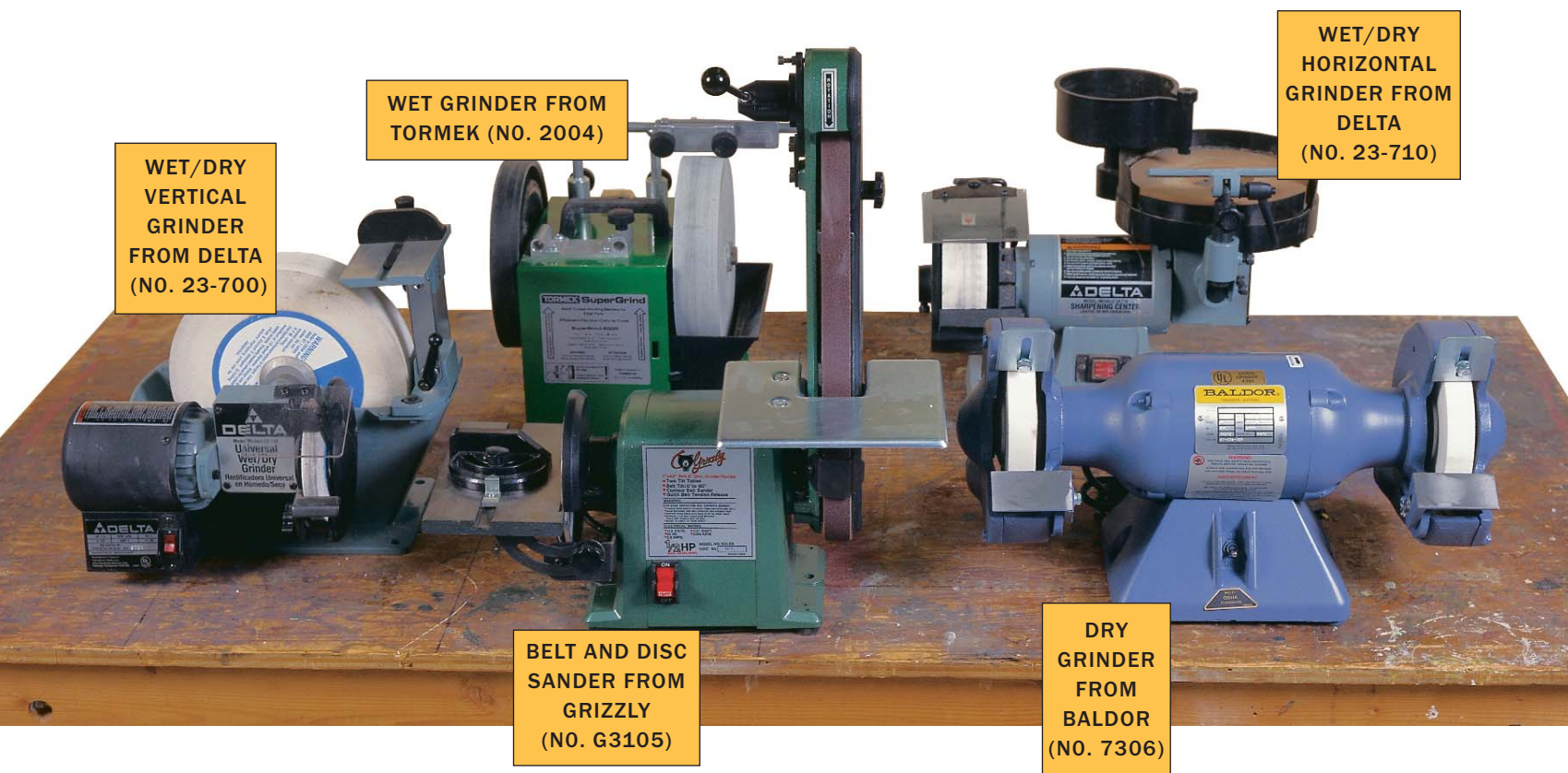


# Not the Same Old Grind

Wet or dry? Wheels or belts?

A survey of machines that shape and sharpen tools.

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Chances are, sooner or later, most of your cutting tools will need a grinding because a simple touch-up on a benchstone won't be enough. Maybe the cutting edge has a large nick, or the bevel angle is too steep. Whatever the reason, chisels, plane irons, planer and jointer knives, turning tools and carving gouges can be sharpened quickly with the right grinder. It's simply a matter of matching the machine to your needs. What follows is not a head-to-head tool review, but a representative sampling of the types of grinders on the market.

For this survey, my students and I looked

at Baldor's No. 7306 bench grinder, Delta's No. 23-700 Universal Wet/Dry grinder and No. 23-710 Sharpening Center (also a wet/dry machine), Grizzly's No. G3105 belt and disc sander and Tormek's No. 2004 SuperGrind water-cooled grinding system (see the photo above).

We tested each machine by grinding a broad sample of tools and discovered that with most of the grinders we looked at, tool rests were too small or didn't allow enough angle adjustments for grinding woodworking tools. In short, we concluded that there is no ideal grinder and that each of these machines has idiosyncrasies



**Stay away from silicon-carbide wheels.** The dark gray silicon-carbide wheel (right), which comes standard on most dry grinders, will burn the steel and destroy the temper of most woodworking blades. The softer pink and white aluminum-oxide wheels break down under the stress of grinding, which helps avoid overheating the tool.



that you need to take into account when choosing one for your sharpening needs.

### Dry double-arbor bench grinders are most common

These bench grinders are familiar to most people and, in my opinion, can handle the broadest variety of woodworking tools. Today's motorized dry double-arbor bench grinders evolved from the old hand-cranked grinders. You can find all sorts of bench grinders, from those cobbled from spare parts and used motors to expensive heavy-duty industrial machines, such as the Baldor No. 7306 with its 1/2-hp motor and 7-in.-dia. wheel. Wheel size and power ratings vary considerably.

Motors usually run at either 1,800 rpm (which is considered slow) or 3,450 rpm. Woodworkers look for a wheel diameter between 6 in. and 8 in. and a rating of 1/4 hp or 1/2 hp. Most bench grinders come with silicon-carbide wheels that will easily burn up any woodworking tool. You should replace these wheels with the softer, bonded aluminum-oxide wheels that are offered in many woodworking-tool catalogs. You may want to buy coarse- and fine-grit wheels to handle a wide variety of tools. Also, the stock tool rests supplied with most bench grinders are poorly designed. Many woodworkers either build a rest of their own or buy an aftermarket rest.

Because they run dry, bench grinders can easily burn the tool steel. Dress the wheels often to keep them running true and to expose a fresh, sharp abrasive surface (for more on dressing, see the story on p. 50). Also, dip the tool in water frequently to keep it from overheating. One accessory that greatly lessens the chance of burning is a misting device (see the left photo above). Other accessories such as felt buffing wheels, rubberized abrasive wheels and laminated paper wheels are available for power honing.

To avoid an accident, follow the manufacturers' recommendations for wheel speeds, and hone with the wheels turning away from the tool edge. Of the grinders we surveyed, there seem to be more aftermarket accessories available for bench grinders than for any other type.

After I replaced the wheels with ones made of aluminum oxide and modified the original tool rest with a straight-edged tool-grinding attachment designed specifically for the Baldor No. 7306 (see the right pho-



**Turn your dry grinder into a wet one.** Misting devices spray a steady stream of water to cool the tool and to keep grinding dust to a minimum. This one runs on a supply of water from a plastic jug and air from a compressor set at 80 to 90 psi.



**This accessory enhances safety and consistency.** A heavy-duty grinding attachment designed for the Baldor No. 7306 secures the blade as you slide it in a steady path across the wheel.

to above), this machine performed quite well. The attachment has a screw-advance mechanism that produces predictable results. But keep in mind that bench grinders generally require that you master freehand techniques for grinding most edges.

### Belt-sander grinders are a low-cost alternative

You may not have realized it, but sanding belts can be just as useful for grinding steel

as they are for sanding wood. Belt-sander grinders typically come with aluminum-oxide belts as standard issue—which will work—but you can also buy specialized sharpening belts designed to grind all kinds of hardened steel. And with many of these types of machines, you can purchase a leather belt and dress it with a honing compound to get a highly polished, mirror finish on your tools. One drawback with these machines is that the tool rests are



**Customize the belt sander's tool rest for better performance.** A block of wood, notched and back-beveled to clear the sanding belt, makes this machine more useful for a variety of blades.





## More than one way to dress a wheel



The four tools shown at left use steel wheels, diamond tips, diamond dust or silicon carbide to do the same job: to dress, or refurbish, the cutting surface of grinding stones. Truing up the surface of a grinding stone will make it cut better and lessen the chance of burning the steel.

In general, the steel wheel dresser and the silicon-carbide sticks produce

a coarse dressing on badly worn wheels. Diamond-tipped dressers (second and third from left in photo) refurbish a worn wheel to a finer surface. If I could buy only one of these tools, I'd choose the single-point diamond-tipped dresser. Dressing tools are available through industrial suppliers and some wood-working supply catalogs.—B.D.

usually limited in versatility. Again, you're often better off designing and fabricating your own rests for your grinding needs.

Belt-sander grinders can handle a wide variety of tools. However, using them requires a refined technique because of the amount of freehand grinding involved. Some people consider this feature an advantage over other grinders that need specialized jigs for every tool imaginable. Typically, belt-sander grinders produce a

**Not all tool rests are equal.** The author found the stamped-steel tool rest on the smaller wheel of the Delta No. 23-700 to be inadequate for most grinding needs because of its size and limited adjustability. The tool rest for the larger wheel is more stable and more versatile.



flat bevel, but an experienced operator can achieve round and even hollow bevels by using the wheel that drives the belt. As with bench grinders, belt-sander grinders run dry, so there is a danger of burning the edge of a tool. Be sure to match the grit size to the amount of stock you want to remove and to dip the tool in water or some coolant frequently. A word of caution: Remove any wood dust that has accumulated on or around the machine because sparks from grinding can start a fire.

The Grizzly belt and disc sander is a good example of this type of machine. Right off the bat, we rigged up a tool rest to replace the one that came with the machine. This belt-sander grinder is best at handling general woodworking tools such as plane irons and chisels. Smaller tools, or those with odd shapes that require more grinding finesse, are not easy to sharpen with this machine. This belt-sander grinder would be fine for the woodworker who occasionally grinds a tool or who needs a machine that can be used for wood as well as for metal. Learning how to use one of these machines effectively will require some patience.

### Wet grinders keep the tool cool

Wet grinders evolved from applying modern technology to the human-powered sandstone grinders of yesteryear. Some current models improved only by replacing the sandstone with aluminum-oxide wheels. Other models are carefully thought out, highly jiggged pieces of engineering that can nearly guarantee absolutely predictable results. You can find a low-tech

model for around \$130, while fancier versions cost more than \$800. Some wet grinders have been combined with a dry grinding wheel or a leather stropping wheel to make the grinder more versatile.

All of these machines share some common traits. By incorporating water into the grinding process, they eliminate the danger of burning a tool. The water wheels run at low speeds—usually under 100 rpm—so metal is removed at a slower rate than it is with dry grinders. Even at the low speeds, all of the water wheels are sloppy, so be prepared to deal with slurry slung from the wheel. As a class though, most woodworkers consider these grinders to be the best because of the quality of the sharpened edge. I agree: I am convinced that a



**Grinding from the side on the Delta No. 23-710.** By mounting this tool rest to the side of the wheel, you can get a flat bevel on the blade instead of the hollow-ground bevel you get by grinding the blade from the front of the wheel.





**Simple steel (or “star”) wheel dressers** sell for about \$15. The wheels eventually wear out but can be replaced.



**Single-point diamond-tipped dressers** are priced according to the carat size of the industrial diamond. Expect to pay from \$15 to \$60.



**Broad-tipped diamond dressers,** rated by the grit size of the diamond dust, cost from \$20 to \$85.



**Silicon-carbide sticks** produce a coarse dressing on well-worn wheels and cost from \$2 to \$10.

dry-ground edge, even one perfectly done, still loses a bit of temper at the microscopic level. Wet-ground edges don't have this problem.

Two of the three grinders we surveyed run the wet wheels vertically, therefore producing hollow-ground bevels. The other grinder uses a wet wheel that runs horizontally, therefore producing a flat bevel.

**Two Deltas and a Tormek**—The Delta No. 23-700 Universal Wet/Dry grinder is a combination machine with a 5-in.-dia., 5/8-in.-thick, 100-grit aluminum-oxide dry wheel and a 10-in.-dia., 2-in.-thick, 220-grit aluminum-oxide wet wheel. The dry wheel revolves at 3,450 rpm; the wet wheel turns at 70 rpm. The tool rest for the dry wheel is stamped steel of poor design, and it is largely inadequate for most grinding needs. The design of the wet-wheel tool rest is better, but it works only for large, straight-edged tools such as chisels and bench-plane irons. With the wet wheel, you can grind either into or away from the edge of a tool by moving the tool rest. The water well has a small drain screw, but to clean out all of the sludge after using this machine for a while, the unit has to be dismantled. My students and I found this grinder, as designed, limited in terms of the types of blades you could sharpen with it.

The other wet/dry grinder marketed by Delta is the No. 23-710 Sharpening Center. It consists of a 5-in.-dia., 2-in.-thick, 120-grit aluminum-oxide dry wheel that runs vertically and an 8-in.-dia., 1,000-grit aluminum-oxide wet wheel that runs horizontally. This machine, definitely a step up from the

model No. 23-700, can sharpen a wider variety of tools. Once again, though, the poorly designed tool rest for the front of the dry wheel allows only a limited range of adjustment. The dry wheel is meant for rough shaping, and you have the option of situating tool rests either in front of or to the side of the dry wheel. That choice means you can achieve either a hollow bevel or a flat bevel on the tool.

The wet wheel is intended for light grinding or even honing and performed well grinding straight-edged tools. I've heard of people who use dedicated wet wheels for gouges only. The wheels are soft enough that the sweep pattern is easily formed into the shape of the wheel. We also tried the sliding tool rest (an optional accessory) for



**Sharpening a curved gouge on the Tormek.** The carving-tool jig shown here steadies the blade of this curved gouge as it is rolled against the wet wheel.



planer and jointer knives, which works on both the dry and wet wheels. No matter what I did to adjust it, I couldn't get rid of a large hollow in the length of a 12-in. blade.

And finally, the other wet grinder we surveyed is the Tormek No. 2004 SuperGrind machine. When you buy one of these machines, you're not buying just a grinder but a whole system—and a well-thought-out one. The grinder is simple: a wet wheel on one side and a leather stropping wheel on the other, both running vertically. As separate accessories, you can purchase 10 (and counting) specialized jigs to handle a wide variety of woodworking tools. Most beginners, including my students, love this machine because it produces results that are controlled and predictable.

The Tormek grinder excels at grinding straight-edged tools, but it can also handle curved shapes. There are some weak points, though. This grinder doesn't seem to me to be suited for the rough shaping of tools, because the wheel is soft and wears quickly and is expensive to replace. To date, no jigs or tool rests have been developed for smaller blades such as those we use in finger planes and some hand knives. While the flat tool rest provided for free-hand grinding works with larger conventional tools, it didn't work with short tools that required bevels less than 35°. The diamond-tipped wheel dresser works adequately, but it looks to me as though it is likely to wear out quickly because of the way the diamond particles are mounted. On the positive side, the wet wheel well is easily removable for cleaning, and the system comes with a thorough manual. □

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