

Metalworking skills make you a better woodworker

Like it or not, a good woodworker has to be something of a metalworker, too. The majority of woodworking tools are, after all, made of metal. The more understanding a woodworker has about working with metal, the easier it will be to tune, adapt and even make tools, all practices common to generations of woodworkers.

As a kid my first job was working in Ole Olson's automotive machine shop, in Seal Beach, Calif. One thing I learned was to use the right tool for the job. But he also taught me that if you didn't have the right tool, you could just make or modify one.

Recently, I showed a class how to slim down a chisel on a bench grinder so that we could cut some very small dovetails—so small that even a 1/8-in. chisel was too wide. In a jiffy, being careful to keep the chisel cool, we were able to modify the tool to fit this special application.

My metalworking capability advances my woodworking by opening new ways to use, adapt and make the tooling I need for woodworking. Instead of being stuck with what is available in catalogs, it has become natural to modify hardware, tools and machines, use metal in jigs, even make tools from scratch. When I look at my collection of woodworking machines and tools, I see wrenches with one end cut off to fit into a confined space, saw tables with holes drilled and tapped for accessories, scrapers cut to fit molding contours and an assortment of odd-looking but invaluable jigs and gizmos.



The key to grinding metal is to keep it from overheating. Use a light touch and pause often to dunk the tool in water. Aluminum-oxide wheels, usually white or pink, produce less heat than standard-grit gray Carborundum wheels. Slow-speed motors also help.

Many woodworkers steer clear of metalworking, remembering when they turned an expensive chisel blue with a bench grinder. But there's nothing to fear about cutting, grinding, filing, drilling and tapping metal once you understand a few rules of thumb and invest in a few tools. If you are truly ambitious, you might even try making your own hardware, to make your furniture unique.

Grinding and shaping

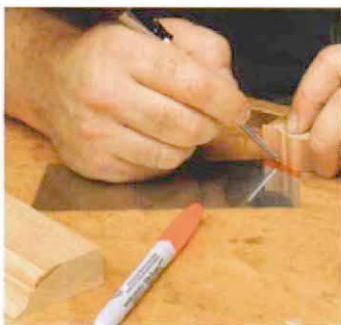
As most of us have found out the hard way, it isn't difficult to ruin a chisel on a bench grinder. But it isn't hard to *avoid* ruining it, either. The important thing to remember when grinding any sort of metal is to keep it cool.

If the metal ever gets hot enough to change color, it will change the temper of the tool. If, however, you keep the tool cool enough to hold in your bare hand, you can grind all you like, modify the shape to suit the task or simply re-new the bevel.

Here's how it works: First, use very little pressure on the grinding wheel. The abrasive will remove metal very quickly with even a light touch. Olson used to say, "Just tickle the wheel." Grind patiently, and the tool will never get too hot. Just to be on the safe side, however, I frequently swish the tool in cold water.

There are also a couple of equipment changes you can make to minimize the chance of overheating the tool. The gray Carborundum wheels that come with new grinders are too hard for fine

MAKING A CUSTOM SCRAPER FOR A COMPLEX MOLDING



Lay out the profile. Paint the scraper stock with a permanent marker, then scribe around a cut-off of the molding. An awl will leave a sharp, precise line.



Grind close to the line. Set the tool rest perpendicular to the grinding wheel, and use the corner of the wheel to reach into concave areas of the profile.



Fine-tune the profile with round and flat files. Finish by honing the edge with stones and burnishing it (for photos of these steps, see Q&A, p. 108).



A custom scraper makes short work of tool marks. It would be very difficult to sand this profile, but the scraper smooths the surface and leaves crisp edges.

DRILLING AND TAPPING CAST IRON

Use a center punch, the right drill size and some light oil. The hardened tip of the punch leaves a small indentation to guide the drill. Apply a lot of pressure when drilling metal, but take breaks to let the bit cool. When cutting threads, in this case to bolt a power feeder onto a tablesaw, back out the tap frequently to clear the chips.



it won't bang against other metal tools. While you're at it, either make or buy a handle for the file. It's all too common to hear about someone sticking the bare tang of the file into their hand.

Smaller files come in handy for removing rough edges, such as when tuning up a handplane. You can smooth the frog and flatten the edge of the chipbreaker and file the throat opening smooth.

Use firm pressure when drilling metal

Twist drills, which are made for metalworking, also work fine in wood, but brad-point drills don't work in metal. All you need to remember with twist drills is first to indent the center point of your intended hole with a center punch. Give the punch a solid rap with a ball-peen hammer to make an indentation in the metal. This makes a small crater so the drill won't wander as it starts.

Drilling holes in steel requires a fair amount of pressure; a drill press is your best bet. If the bit spins without cutting, heat will build up quickly and dull the bit. When in doubt, apply more pressure rather than less. Just as with wood, the larger the drill bit, the slower the speed. As the drill breaks through the other side, the bit will grab the metal part and try to spin it out of your hands. Clamp the piece before you begin, to avoid this hazard.

Drilling cast iron—Cast iron is the typical material used in tabletops for woodworking machines. If you're ever faced with mounting an aftermarket fence system on a tablesaw, you'll probably have to drill into cast iron. And there are other reasons for doing so. I must have 25 or 30 extra holes in my shaper's tabletop and at least a dozen in the top of my tablesaw for mounting accessories, such as a power feeder, in a variety of locations and bolting down jigs and guards securely.

There is no harm in drilling holes in the cast-iron tops, as long as you avoid the webbing braces cast underneath. Look at the underside to see what areas to avoid.

A drill press works well for drilling small pieces but won't work for a large cast-iron tabletop. Use a hand drill, keeping it as square as possible to the tabletop, and apply as much pressure as you can.

Some tips on tapping threads

If you have a fixture that must come on and off the table frequently, tapped holes will save you from having to reach under the table to access nuts. Threads also can be tapped in hardwoods, too, when building jigs, for example.

It's very easy to tap threads in the holes you just drilled in the tabletop. But it's important to use the correct drill size. There are charts for these sizes. Some are in-between sizes denoted by letters, not fractions. I recommend using individually packaged drill and tap sets. Three thread sizes will handle almost every situation: $\frac{1}{4}$ -20, $\frac{5}{16}$ -13 and $\frac{3}{8}$ -13.

Use some kind of light oil to lubricate the hole and the tap; the threads will cut much more smoothly. Also, use a tap wrench. It will hold the tap securely, give you just the right amount of leverage and help you keep the tap square. To get the tap started, it takes a bit of downward force as you twist, about as much force as it took to drill the hole. Once it's started, the tap will thread itself.

As you rotate the tap, chips will build up inside the hole, and the tap will get harder and harder to turn. Back out the tap enough to clear the chips, then continue. □



work, such as shaping a chisel or a contour on a scraper. A better bet is a softer aluminum-oxide wheel, usually white or pink in color. Remember, the finer the grit, the greater the friction. I run an 80-grit wheel for most grinding. A typical bench grinder turns at about 3,600 rpm. But you can get one that turns at half that speed, around 1,800 rpm. The slower speed will work almost as quickly and generate less heat.

A word to the wise: I made the mistake of using only my eye-glasses to protect my eyes from grindings, and I ruined an expensive pair of lenses in one day. Now I wear sacrificial safety glasses over my regular glasses when working metal. Obviously, wearing no eye protection at all would be a recipe for disaster.

Invest in a few metal files

With metal files you can shape, sharpen and true scraper edges. A scraper can be made to just about any contour (see the photos on p. 100). A custom scraper like this will remove tool marks from a molding without dubbing over the edges the way sandpaper does.

A single-cut metalworking file, called a mill file, is perfect to have around. Chances are the old file you have rattling around in your tool box is dull. Get a new one. Keep the new one in a place where