

# Care and Sharpening of Router Bits

by Zach Etheridge

Dear Zach,

*I spoke to one of the guys on the phone at Highland Hardware just now and complained about the enclosed router bit, a 1/2", 8° carbide dovetail bit which came with my Leigh jig. He said to send it in to you so you could look at it. I'm getting what I would consider excessive tearout, and then I noticed the chipped edge. I have probably less than a dozen completed projects on this bit.*

*The wood [sample cut enclosed] is a South American hardwood called Incienso (?). Your comments would be appreciated.*

This is fairly representative of the kinds of problems we're asked to deal with when our customers have trouble with their router bits. Tearout, burning, excessive feed pressure, and "spontaneous edge fracture" (to coin a fine, technical-sounding term) are problems most of us have experienced at one time or another, and here at the store we've had plenty of opportunities to think about why these things occur and what might be



done to minimize them.

Sometimes there really is a flaw in the offending router bit, but over the years it's been our experience that

at least 80% or 90% of the time performance problems originate in the shop — and can easily be solved there as well. The above letter was a timely reminder that a few tips in this issue of *Wood News* might help you avoid the aggravation of working with cutting tools that don't cut right.

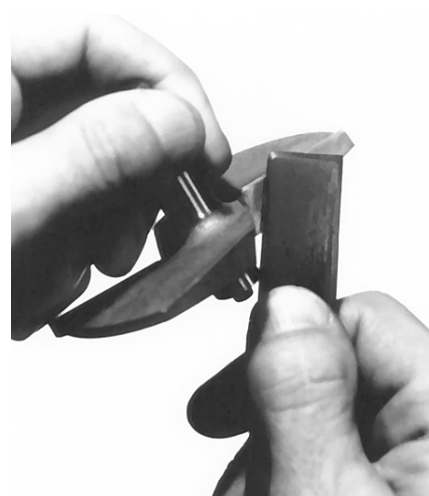
If router bits were hand tools we'd almost certainly handle them quite differently, but when it's the power company that's doing most of the work, it's easy to forget what makes cutting tools cut. For me, it took a long time to begin looking at router bits as cutting tools fundamentally no different from my hand tools, requiring frequent inspection and routine maintenance. Once I made the connection, I was astonished at how much better my bits worked — and just a little embarrassed that it took so long to figure it out.

When working with hand planes or chisels, we take it for granted that we'll have to stop fairly often for a quick round of re-sharpening. Even though good-quality carbide can be expected to hold an edge perhaps twenty times longer than tool steel, it should be fairly clear that sharpening is going to have to be regular business; if a good chisel might need sharpening twenty times during the course of a week's hard work, then a carbide-tipped router bit doing the same work will have to be sharpened at least once a week. I don't know about you, but that sure isn't the way I used to treat my router bits. Even on a hard, brittle wood like the sample that accompanied our correspondent's bit, tearout can be greatly reduced with a *sharp* bit.

Sharpening router bits is surprisingly easy to do. You don't need a



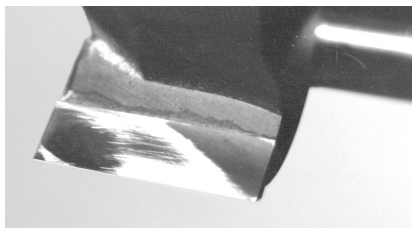
sharpening jig, precision measuring instruments or complex machinery. All you need are a couple of diamond paddles (or diamond needle files for the smallest bits), a good light source and a comfortable place to sit. You're only going to work on the flat radial



face of each flute, so there's no fancy fingerwork required. (You don't want to work on the outside edge of the flute, of course, because that would alter its diameter or profile quite quickly.) It's fairly important to sharpen uniformly so the bit will remain balanced and cut smoothly. Rather than working on one flute until it's sharp, and then doing Lord knows what to the other flute, you can insure an even job simply by giving one flute five or ten strokes, rotating the bit and giving the next flute the same number of strokes, then back to the first, and so on. Lay the diamond paddle or needle file on the flat face of the flute, holding it lightly so you can feel it staying flat, and have at it. Your diamond abrasives can be used dry, but they'll resist clogging better

and need cleaning less often if you keep them wet with water or light oil. I usually hold the bit in one hand and the sharpener in the other, but if it feels better to you, try securing the bit in your router collet or drill chuck on your workbench.

Take a good close look at each flute as you work. What you're accomplishing will be unmistakably clear, and it will be obvious if you're doing the job the way you want to, or if you're putting more pressure in one place than another, or perhaps missing a spot entirely. By the way, don't be surprised to discover that the surface of the flute isn't flat as it comes from the factory. It might take some extra work the first time out to lap each flute entirely flat so you can get on with the business of creating a sharp edge. I suggest that you work with fine (600) or extra-fine (1200 grit) diamond abrasives; if a bit needs more aggressive work than these can provide, it probably ought to be sent out for professional grinding. Coarse diamond abrasive wielded by hand will simply fracture brittle carbide edges. The damage to our problem dovetail bit, for example, is severe enough to require commercial resuscitation.



How do you know when the bit is finally sharp? Just feel it and look at it. If under a strong light you see no flecks of light along the edge, and if it feels good and sharp, then it *is* — you're done.

Regular cleaning is nearly as important as sharpening. Baked-on crud around a cutting edge interferes with chip clearance, reduces relief behind the cutting edge and increases frictional heating just as

if the edge were dull. Plain old caustic oven cleaner (I used to use Easy-Off) does a fast, reliable and harmless job (harmless to the bit, that is — *you* be careful!) of dissolving the nastiest accumulations of resins and glaze. Now I use our non-caustic Blade & Bit Cleaner instead. Remove ball bearing pilots before cleaning. Brush or spray a liberal coating of cleaner all over the cutting edges, let stand ten or fifteen minutes, then scrub clean with a toothbrush or brass stove brush under a stream of warm water. Dry the bit thoroughly and go back to work. I recommend against oiling router bits to prevent corrosion, since it's friction that holds them in the router. Just dry them well and you should have no problem with rust.

If you're working in pine or other resinous woods, it might be necessary to clean your bits every day. It might take a while to get used to that idea, but the payoff will be pretty convincing. Dri-Cote™, a spray-on coating available from Highland Hardware, does an effective job of slowing resin accumulation on bits and helping them run cooler.

Next, and perhaps as important as any of the foregoing, is the simple matter of how you handle your cutting tools. You know that when you've put several minutes into honing a plane iron to perfection, you naturally tend to handle it with considerable care. One slip while setting it into the plane, and you get to sharpen it all over again. Carbide too is very easily damaged when freshly sharpened; casual handling around wrenches or template guides can fracture a cutting edge before it ever makes a cut. It may be merely a coincidence, but the damage to both flutes of our problem dovetail bit falls exactly where the flutes would contact the wall of a 7/16" template

guide (the size used with the Leigh jig) if the bit were raised a little too far while setting up for a cut.

Extreme stress is another potential source of carbide failure (not to mention shank failure), particularly in this age of monstrous routers so powerful that you don't even notice when you're loading a bit to death. Under load, 1/4" shanks can allow



enough vibration to visibly affect the quality of cut, and if you could watch the bit through a super slow motion microscope you'd see it jerking around in the cut and slamming into the walls rather than slicing cleanly through a smooth arc.

Dovetail bits are especially susceptible to overload, for two reasons: first, where the flutes are ground to their

narrowest point the actual shank diameter may be as little as 3/16". Second, dovetail bits must usually run at full depth in one pass. In very hard wood, you can reduce stress by first making two or three passes with a 1/4" straight bit to clear as much waste as possible, leaving only the lower corners to be removed by the fully extended dovetail bit.

The time you spend cleaning, sharpening and using your router bits gently almost surely costs less than replacing a bit when it dies before its time. It's certainly worth a fair amount of work to avoid the nuisance of feeling a bit has gone defective on you, sending it back where you bought it and then waiting for a replacement. And if your work turns out a little better because your bits are always in like-new condition, call it a bonus — you'll have earned it.