

Tip #21 All About Router Bits

Power woodworking routers will work as well as the cutting tool that fits into them.

Maybe you just bought the Shopsmith Router Package or took the plunge and invested in the Router Arm and got a portable router that sports a high torque motor. But without a good bit in the chuck, even the best router with the most powerful motor is as handicapped as a hammer without a handle.

Not to worry though! Most of the bits that you can purchase are good when you get them. This is certainly true of the four high-speed steel bits that come in the Shopsmith Mark V Router Package. The problem comes after you've used them for a while.

Look at it this way: a good circular saw blade is a cutter with a large number of cutting edges — 24, 36, even more on a plywood blade. With proper care, it will stay sharp a long, long time. But router bits carry only one to four cutting edges. That means each edge of a router bit does far more work than an individual saw tooth.

Any way you cut it, router bits will lose their keen edge more quickly than a tool that carries more teeth. If you're routing plywood or particle board, the rock hard glue in those materials wears the edge off bits very fast. And if you hit a concealed screw or nail with a router bit, you might as well kiss it goodbye. Used with care, however, you can spruce them up time after time.

Router bits: two basic types

Router bits can be divided into two types: those made of carbide or with carbide tips and those made of one piece of hardened high speed steel.

Carbide-tipped bits: the Rolls-Royce of cutters

Carbide and carbide-tipped bits were first used by industry when this extremely hard (80 on the Rockwell "C" Scale) alloy was developed in the late '50's. Widely available and popular with even the average consumer now, these bits are made by brazing extremely hard carbide cutters onto a face of high speed steel. They cost more, but they last longer.

Their ability to take harder-than-average use makes them a good investment, but you should know that carbide-tipped bits, even when brand new, are marginally less sharp than top quality high speed steel bits. This does not affect their overall performance, however, and carbide-tipped bits still outperform high speed steel bits in the long run.

When you buy them, take a good look (with a magnifying glass if you like) at the brazed joint between the carbide alloy and the steel face. Tiny, hairline fault cracks or bubbles there might indicate a poor quality tool. There's no way to forecast disappointment for certain, however, since small gaps might cause no long-range problems at all. Still, to be safe, buy a bit that at least looks well-brazed.

Not all carbide-tipped bits are created equal, either. Some are tagged simply "Carbide", while others are called "Carbide Production Bits". The production-type usually have a heavier deposit of carbide brazed onto the cutting edge. Since every sharpening of a bit reduces the diameter of a cutting edge a little, this extra deposit of carbide works to allow more sharpening.

If you're planning to use a router for plywood or particle board joinery or edging, by all means invest in a good carbide-tipped bit. If you're trimming high pressure plastic laminate on a countertop, it's definitely best to use a carbide-tipped trimmer with a ball-bearing pilot on the bit as well.

When these bits finally need to be touched up, alas, you really shouldn't try to do it yourself. You shouldn't, that is, unless you happen to own an abrasive diamond grinding wheel! Those rare and expensive accessories are the only sharpening tool that's hard enough to sharpen carbide well.

The good news is that every small town in America seems to have at least one good professional sharpening service. If your local professional lacks the highly specialized tools to sharpen carbide-tipped tools, he probably can recommend someone who does. A qualified tool sharpener can even replace broken or chipped carbide cutting edges.

Since you should send carbide-tipped tools out, the actual sharpening and repair process of these kinds of tools remains something of a mystery for the average woodworker. How can you tell, then, if the local sharpener has done a good job? Held to the light, a well-sharpened edge should not have any shiny spots or small chips. The final test is simply to use it - you'll know from the minute it starts cutting how well it's been treated. As a matter of course, it should cut at least as well as when it was new.

High Speed Steel Bits: the workhorses

High speed hardened steel bits are less expensive and found more often in the typical homeshop. Formed as mild steel, these bits are hardened in a special heat treatment, usually to within 60 to 65 on the Rockwell "C" Scale.

There's no real mystery to sharpening most of these bits: the steel in them is hard, but if you own a common bench-stone, you can hone the larger varieties and put a keen edge back on them. The stone you use should be well-dressed, with sharp, well-defined edges. An aluminum-oxide stone works well ("India" or "Aloxite").

You can make the whole process a lot easier if you purchase a set of aluminum-oxide triangular or knife-edge stones. (See Fig. 1.) Their thinner edges make it easier to sharpen these comparatively tiny tools. Even the tiniest of router bits -those used for straight cuts and veining - can be sharpened with a set of these stones. (But watch out! Drop one of these fragile stones and it'll shatter to pieces.)

If you use a benchstone, mount it on your worktable with bench dogs or clamps to hold it steady while you rub the bit on it. Use a lubricant to keep the stone clean.

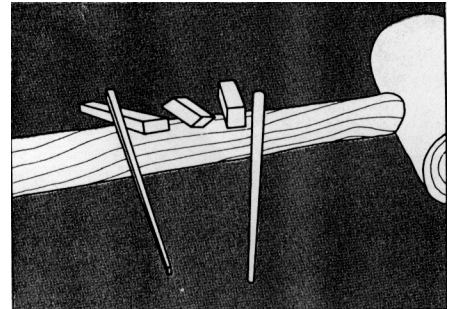


Fig. 1. Special purpose Aluminum-oxide honing stones.

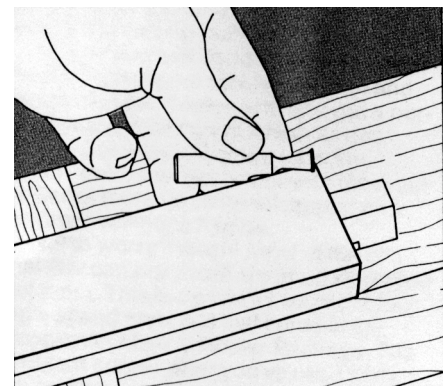


Fig. 2. Honing face of router bit on bench-stone.

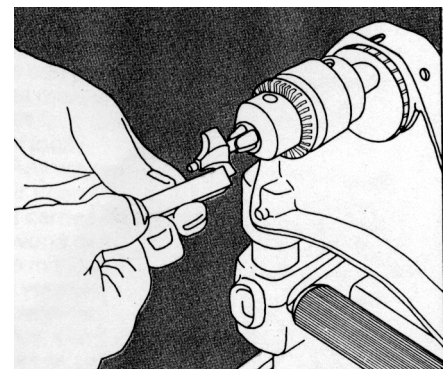


Fig. 3. Drill chuck mounted on tailstock chuck arbor to hold router bits while sharpening.

Honing almost all router bits is based on the principle that the whole face of the cutting flute is on one plane. If that flat plane is large enough, you can find and hone it. Touch-up sharpening is always done on the face of the flute, never on the contoured profile. (See Fig. 2.)

Unlike honing large chisels on a bench-stone, the action of the stone on these small tools is limited to very, very small movements: 1/4" total back and forth movement, or even less.

You might choose to mount the bit securely in a vise and move the stone. You can put together a handy vise to hold router bits by mounting the drill chuck on the tailstock chuck arbor in the lathe tail-stock of the Mark V. (See Fig. 3.) Squirt a drop or two of oil on the bit itself and position the stone on the major portion of the flat. Avoid rubbing the pilot as you hone - this will ruin the bit. When the oil on the bit darkens with swarf (little flakes of metal) you'll know that you're on the way to a keen edge.

If you're having trouble getting the feel of the flat, you can check just how well you're doing by using a dark color felt-tipped marker to coat the bit's face. By checking to see how much of the color is removed, you can tell whether you're honing the entire surface. It helps to use a good, concentrated light and a magnifying glass.

If a burr forms on the profile of the bit, remove it carefully with a Hard Arkansas stone.

To check for sharpness, run the cutting edge over your thumbnail: it should "grab" the nail and leave a light "track" rather than slip over it easily.

The shaft: don't overwork it

A small shank coupled with a large cutting edge can weaken a bit. The larger the shank, the stronger the bit. This is one reason why Shopsmith router bits are made with a heavy-duty industrial size 1/2" shank. When buying a hand-held router, get one that has a 1/2" collet accessory so that you can make use of a full range of shank sizes.

Don't overwork the shank and the bit by "hogging" into stock at high speed. This stresses the bit and the router motor, overheating both. Whenever practical, take light cuts in smooth passes.

In mounting the bit into the router chuck, push it in till the shaft touches "bottom," then back it out 1/8". This prevents transferring vibrations from the bit to the motor armature.

General routing tips

When possible, feed stock into the router against the rotation of the bit. This prevents the speeding bit from grabbing and forcing the stock past the cutting edges too quickly.

Clean router bits always work better:

use oven cleaner to remove wood resins built up on them. Ball-bearing pilots especially need to be kept clean. When used to trim laminated material, a router bit with a ball-bearing pilot can really get gummed up. Clean the outer collar with a tip of a rag soaked in a solvent that will dissolve the type of glue used.

In using the Mark V for routing with either the standard 1/2" shank bits or with 1/4" shank bits and a special bushing (see below) you should rev the machine up to maximum speed: about 5200 rpm's. This is still much slower than the typical hand-held router's rpm's of 22,000 to 24,000. But routing doesn't require high rpm's - it can be done at slower speeds. Simply feed stock more slowly in-to the bit and take lighter cuts.