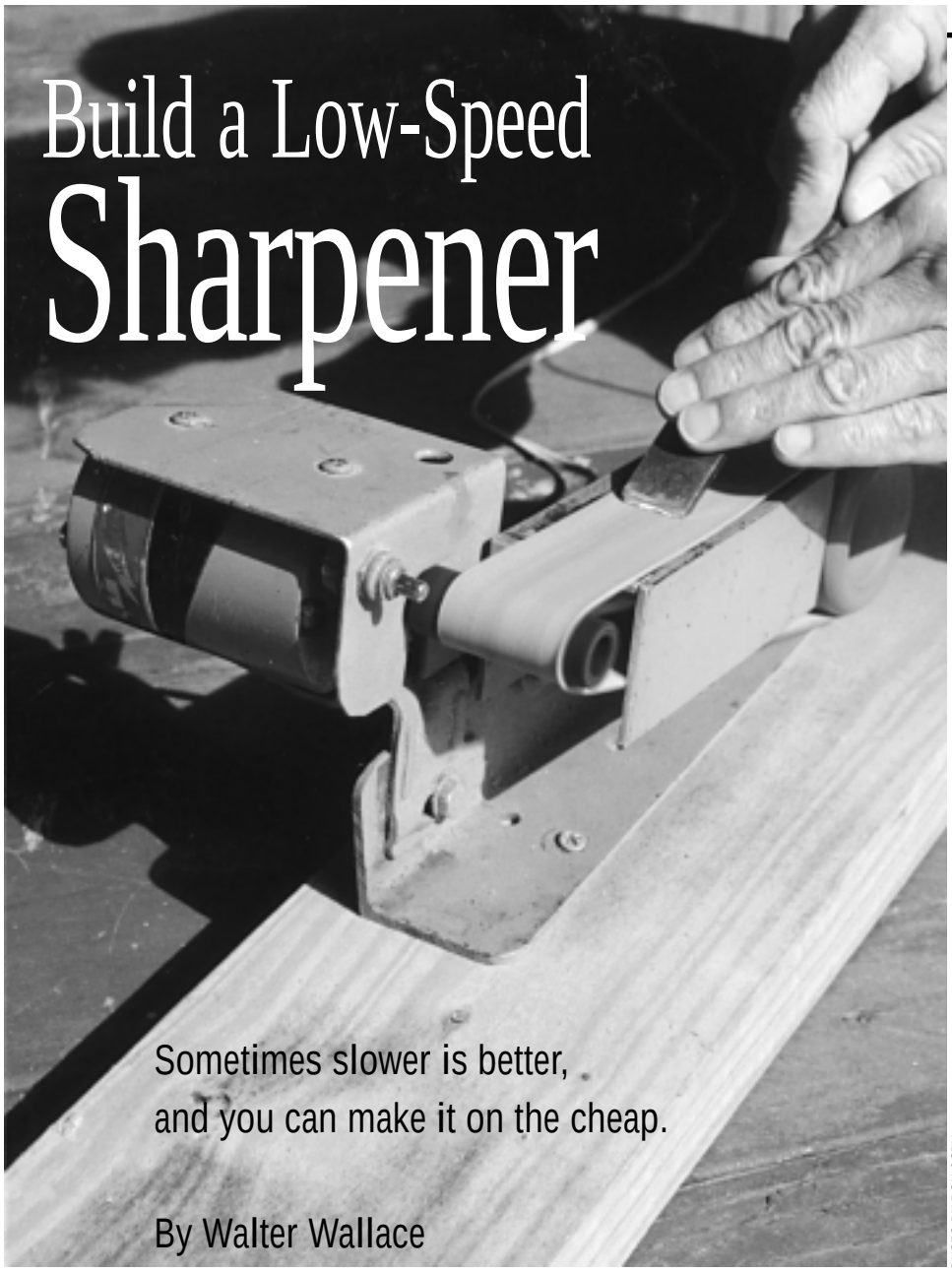
Build a Low-Speed Sharpener



Sometimes slower is better, and you can make it on the cheap.

By Walter Wallace

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If you enjoy spending time in the workshop, you probably have a bench grinder on hand for all the shaping, grinding, and filing chores you're likely to come across in a typical weekend's work. The trouble is, most bench grinders—with 8" wheels turning at 3,450 rpm—spin far too quickly to do the more delicate sharpening tasks that you might like to accomplish with a power tool.

At that speed, the grinding surface is moving at over 7,200 feet per minute . . . fine if you want to blow away vast amounts of steel every time you touch the stone, but far too aggressive for efficient work. Better you should have a sharpening belt for jobs like this, one that moves at a fraction of the grinder's speed. A slower-moving abrasive is easier to work with and much safer for the edge of a cutting tool, as it's less likely to overheat and remove the steel's temper.

The answer is a low-speed sharpener, which you can make with a few pieces of angle iron, a caster, and a fractional-horsepower motor from an old fan, a sewing machine, or some other small appliance. Most of these are 115-volt AC/DC (universal) motors, but straight AC would work too. Look for one with a 1/4" or 5/16" shaft at least 1 1/2" long, turning counterclockwise when facing the shaft end. The rpm range should be between 3,000 and 5,000 and the horsepower rating between 1/10th and 1/15th.

Once you've found that, you'll need to locate a composite caster wheel to support the other end of the belt. A width of about 2" works well, and though its diameter isn't critical, the 2 1/2" size I used fit the frame perfectly. A composite or rubber wheel is best because it tends to hold the sanding belt on track better than a metal wheel.

With those parts on hand, you can look for the steel needed to make the frame and other parts, detailed in the materials list below. Prepare the base—a 9" piece of 2" x 2" angle—by rounding the corners slightly and filing the edges smooth. Then drill a couple of 1/4" mounting holes through one leg of the angle—toward the center and about 5" apart—and drill a 5/16" hole 3/8" in from the corner of the other leg. To position it correctly, set the mounting leg down in front of you with the other leg upright and to your left. The 5/16" hole should be in the corner farthest from you.

Next, drill two 1/4" holes—2 1/4" and 5 1/2" respectively—from the center of the 5/16" hole and 3/8" from the upper edge of the angle. Finally, center another 1/4" hole through the leg, 1 3/8" from the end opposite the 5/16" hole.

Now you can proceed to the motor mount. I made mine from an old section of right-angle utility bracket about 2" wide and 3 1/2" long. First I cut one of the legs down to 2" in length, then I drilled a 1/4" x 3/4" slot into the metal about 1/2" from the cut edge. (You can make a slot by drilling three or four holes in series, then filing the uneven points flat.) On the other leg, I used one of the existing holes, and a new 7/32" drilled hole, to mount my motor, which had 10-32-size threaded sockets in the base.

The motor you use may not have such a convenient mounting scheme, so you might have to make do to adapt your bracket to the lug, flange, strap, or whatever came with the particular motor you've chosen. At any rate, once the motor is fastened to

its mount, attach it to the forwardmost 1/4" hole in the base using a 1/4" x 1" machine bolt and lock washer.

The faceplate serves as a side guard for the sanding belt and provides a place to mount the switch. To make it, I took a piece of 3"-wide, 1/16" sheet metal and cut a 1/2" x 1 1/2" slot lengthwise into one end of it. Then I bent 3" at the slotted end at a right angle, drilled a 7/16" hole in a corner for the electrical switch, and bored two more holes to mount it to the motor housing. To make the electrical connections, I wired the switch between one motor lead and the black leg of an extension cord, using wire nuts. Then I attached the cord's white wire to the other motor lead.

Next comes the backing plate. It's the bed upon which the sanding belt moves and is simply a 5" length of 2" U-channel. Because both the drive roller and the idler are fixed, it's important that the backing plate be adjustable so as to remain parallel to the belt.

To accomplish this, fasten the idler wheel to the base using the 5/16" x 2 1/2" bolt, spacers, and lock washer. Then press the 2" section of neoprene hose over the motor shaft so it just clears the faceplate. I used 1/4" i.d. (inside diameter) hose, but you can increase to 5/16" if your motor shaft is larger. No adhesive or cement is needed if the hose is force-fit over the shaft.

Once the two rollers are in place, clamp or bolt the base to a flat surface and lay a straightedge across their upper surfaces. Then hold the backing plate to the straightedge and use a felt pen to mark its position through the two 1/4" holes in the upright. Take care to position the plate within 1/4" of the idler wheel, and do not allow the bolt nearest the motor to obstruct the return path of the sanding belt. Drill the two 1/4" holes, then file the motor-end one vertically to form a short slot for adjustment. Use 1/4" flat washers as spacers to align the backing plate with the center of the idler, then fasten it with 1/4" x 1" bolts and lock washers.

Prepare the belt by first slicing a 3" or 4" x 21" aluminum oxide sanding belt lengthwise to 2" in width. Then slip it over the rollers at each end and pull the motor forward until the belt is taut. Tighten the motor mount and adjust the backing plate up or down as needed. I find that the belt moves and tracks better if the drive roller is about 1/8" below the surface of the plate.

The composition and grade of paper you use depends on the work you're doing. Generally, a closed-coat aluminum oxide or zirconia grain is best for fine grinding and sharpening. But I also use the grinder as a sander on occasion, so an open-coat aluminum oxide paper works well for woodworking and deburring. Coarse and medium grits are good for rough material removal, while the finer grits (up to 600) are reserved for edging and sharpening. For safety's sake, you should always wear gloves and eye protection, and never wet the paper while using the tool, since the motor has no moisture protection.

Granted, my homegrown sharpener is no Swiss movement, but it does what I ask of it for the occasional jobs I do—all at a fraction of the cost of a "real" machine.

Materials List

1	1/8" x 2" x 2" x 9" angle	base
1	1/8" x 2" x 2" x 5" U-channel	backing plate
1	1/8" x 2" x 3 1/2" 90° bracket	motor mount
1	1/16" x 3" x 6 1/2" angle	faceplate
1	1/10-hp AC/DC motor	motor
1	125 VAC 15-amp switch	switch
1	1/4" x 2" neoprene hose	drive roller
1	2" x 2 1/2" caster wheel	idler
1	5/16" x 2 1/2" bolt	idler axle
2	5/16" nuts & flat washers	axle spacers
1	5/16" lock washer	axle lock
3	1/4" x 1" machine bolts	mount hardware
8	1/4" flat washers	spacers
1	3" x 21" sanding belt	belt