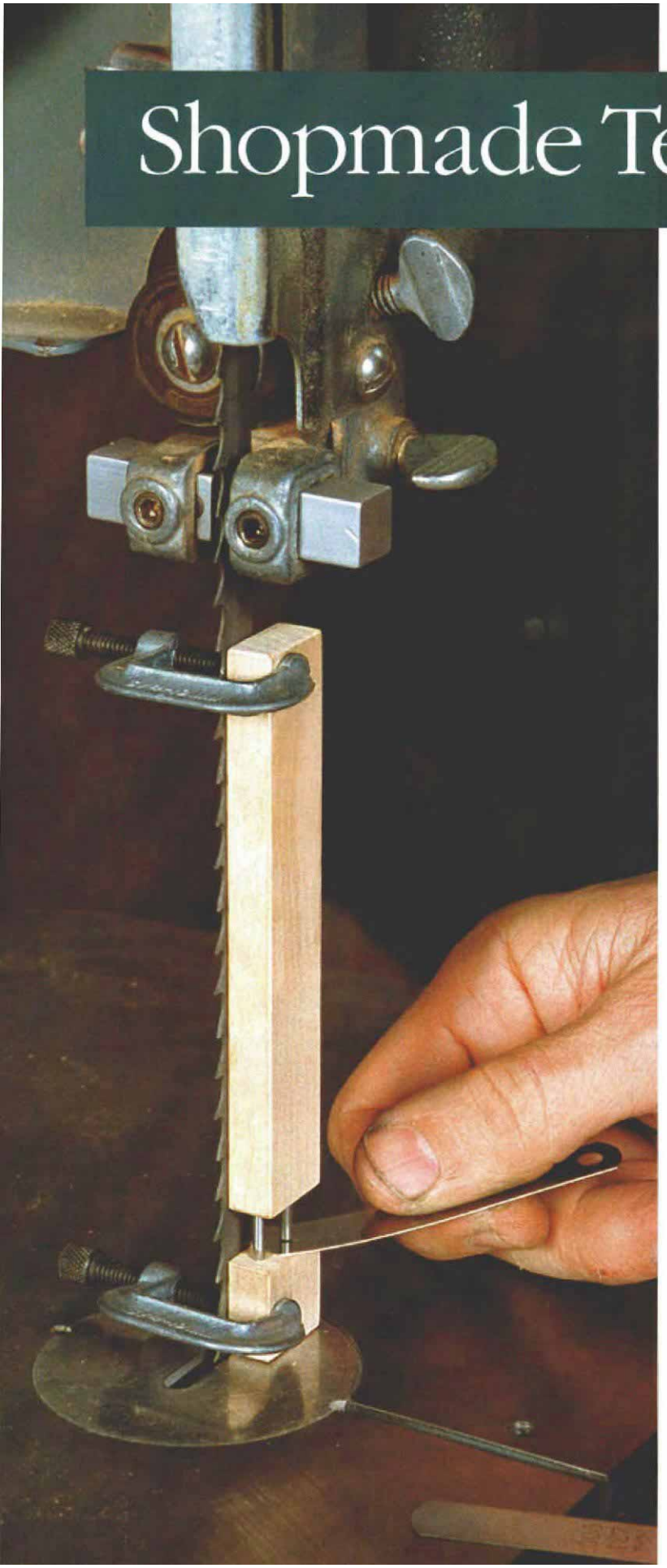


Shopmade Tension Gauge

Built-in bandsaw gauges are notoriously inaccurate. Here's an inexpensive tool that eliminates guesswork

BY JOHN WHITE

A bandsaw blade that's not properly tensioned is going to cause problems no matter how well the rest of the saw is tuned up. And if you're doing an especially tough job, like resawing a wide board or ripping thick hardwood stock, the problems are going to be even worse. In many shops, however, the only way to measure blade tension is to use the gauge built into the back of the bandsaw. Yet these gauges are notoriously inaccurate. That usually results in a blade that is undertensioned.

A blade under too little tension leads to all sorts of grief. It can bow backwards and sideways, causing the blade to cut slowly. It easily wanders from a cut line. And when resawing, the cut often takes on an unwelcomed barrel shape.

But too much tension on a blade creates its own set of headaches. It can overstress the wheels and bearings of the bandsaw, and sometimes the frame, too.

That's where this unassuming little tool comes in handy. Used with an ordinary automotive feeler gauge, it allows you to set the correct tension on your steel blade quickly. And it works with any bandsaw or blade.

Making the gauge

There's nothing fussy about making the tool. A fine-grain hardwood is best here because you want the ends to have hard, flat surfaces. Maple, birch and beech are all good choices.

Start by cutting the hardwood to a ⅜-in.-thick by ¾-in.-wide by 5⅜-in.-long strip. Then, in one end of this strip, drill a ³⁄₃₂-in.-dia. hole for the alignment pin, making the hole 2 in. deep. A T-shaped fixture I made came in handy here, allowing me to clamp the strip so that it is perpendicular to the table.

Next, using a fine-toothed crosscut blade on the tablesaw, carefully cut a ¾-in.-long block from the drilled end of the strip. Before cutting this short block, make index marks on both sides of the cut

Photos, except where noted: Tom Begnal

line. These marks enable you to line up the two pieces in their original orientation when the gauge is assembled. Polish the cut face of the short block by running it across very fine sandpaper laid on a flat surface. Do not round the face. For accuracy, it must be absolutely flat.

Next, drill a ½-in.-deep, 3⁄32-in.-dia. hole for the measuring pin in the end of the long block, next to the hole for the alignment pin. Make the measuring pin by cutting a 6d finish nail ⅞ in. long. It's a good idea to round the working end of the pin slightly, shaping it with a file and then polishing it with a fine stone or emery paper. Then tap the pin into its hole, making sure you don't accidentally use the alignment-pin hole.

Now cut the alignment pin. Once again use a 6d finish nail, but this time cut it 1⅝ in. long. This pin should fit tightly in the short block but slide in the hole in the long block. The simplest way to achieve this is to place the pin in a drill chuck with about ¾-in. exposed and then slightly reduce the pin diameter with a fine file as it spins. The mild steel in the nail will cut quickly, so check your fit frequently and stop as soon as you have a sliding fit. The gauge will be more accurate if there is no excess play. Smooth the ends of the pin and tap its larger-diameter end into the short block, making sure the index marks are facing each other.

That's all there is to making the gauge. But before it can be used, you need to know just how much tension to apply to the blade. And as I learned, the answer to that question depends on the kind of bandsawing you're doing.

How much tension?

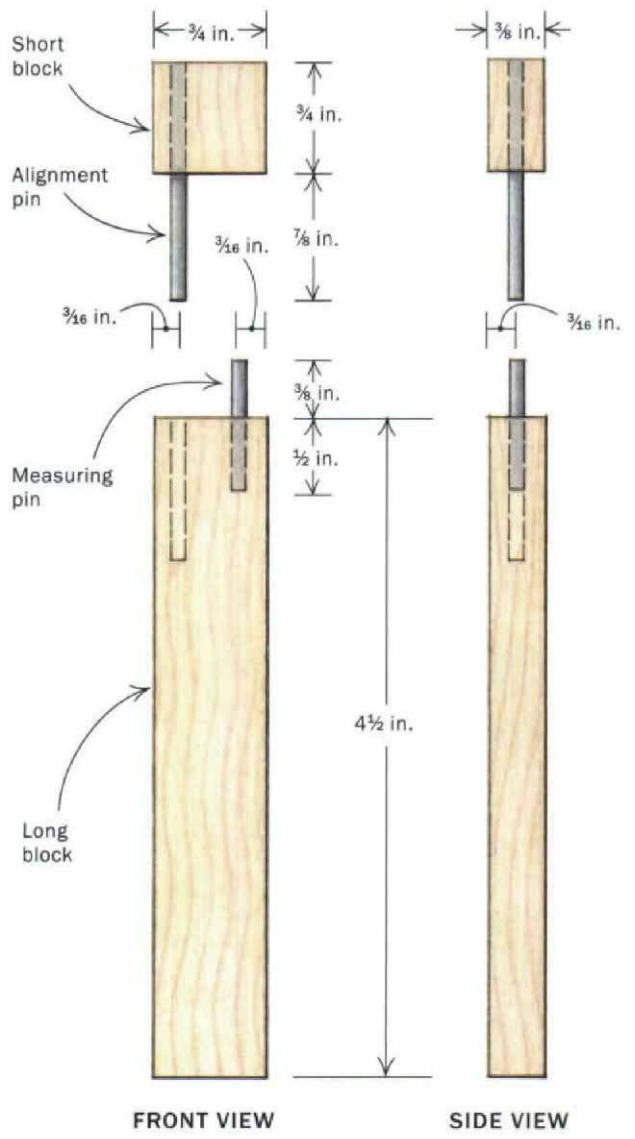
For tough jobs like resawing or cutting thick stock, blade makers suggest a maximum blade tension of 15,000 lbs. per square inch (psi) when using a consumer-grade bandsaw (such as the 14-in. Delta or its cousins). Use the same tension regardless of whether the blade is carbon steel, bimetal or carbide-tipped.

Keep in mind that you don't have to use such high tensions for all work. On a consumer-grade saw, you'll extend the life of the blade, tires and bearings if you lower the tension to about 8,000 psi when cutting thin stock and softwoods.

Any tension beyond 15,000 psi could cause problems with the structure of a consumer-grade saw. But for some of the heavy-

BANDSAW TENSION GAUGE

Not much bigger than a pen, this tension gauge can be made for pennies with a small piece of hardwood and two finish nails.

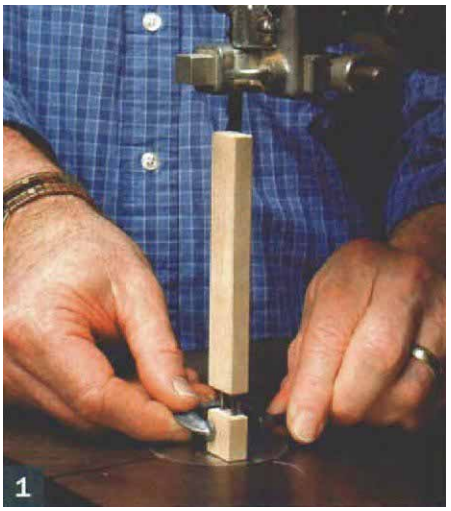


Drill the alignment-pin hole. *Cut a hardwood strip to size, then drill a hole in the end for the alignment pin. A T-shaped fixture keeps the strip square to the table.*

Mark and cut. *After adding a pair of index marks, the tablesaw is used to cut off the short-block portion of the tool.*

File down the alignment pin. *If the alignment pin (a 6d nail) is to slip smoothly into a mating hole, it must be filed down a bit as it spins in the drill press.*

Drawings: Vince Babak



Relax the blade tension. *Then clamp the short block of the gauge to the side of the blade, just behind the teeth.*

Leave room for the feeler gauge. *Clamp the long block to the blade so that a 0.005-in. feeler gauge fits between the block and the measuring pin.*

Add tension to the blade. *Once a 0.008-in. feeler gauge slips between the short block and the measuring pin, back off a bit.*

duty, industrial-quality handsaws, the blade can be tensioned up to 30,000 psi if it's going to be used for resawing.

It's interesting how "psi" translates into the number of pounds of tension applied to the blade and the wheel. A ½-in.-wide by 0.025-in.-thick blade requires a pull of about 188 lbs. to achieve a tension of 15,000 psi. And because both the cutting and returning halves of the blade are under tension, the bandsaw's tensioning spring must push up the top wheel with twice this force, a total of 375 lbs.

The suggested tension, measured in psi, remains the same no matter what size blade you're using. So, for example, because the ⅜-in.-wide blade has a smaller cross-sectional area than the ½-in.-wide blade, you need only about 140 lbs. of pull (280 lbs. on the top wheel) to produce 15,000 psi of tension.

But knowing how much to tension the blade is only half the story. You also have to be able to tell how much tension is actually being applied, which is where this gauge comes in.

The gauge is easy to use

The best way to determine blade tension is to measure the amount the blade stretches as it's pulled taut. As you might expect, steel

Photos, this page (top and bottom left): Michael Pekovich

doesn't stretch easily. In fact, a 5-in. length of blade stretches only 0.001 in (that's one thousandth of an inch) for every 6,000 psi of tension that's applied.

Based on this principle, several companies make a tension meter with a dial indicator that reads the amount of blade stretch. However, at $130 to $320, these instruments don't come cheap.

That's the beauty of the gauge I designed. It measures stretch, just as the expensive version does, but you won't have to stretch your budget to get one. To check the accuracy of my gauge, I set it up in tandem with a top-of-the-line tension meter. The measurements on my gauge were within 10% to 15% of the readings on the tension meter.

And using the gauge is as simple as making it First install a blade on your bandsaw, then tension it lightly and adjust the tracking and guides while moving the blade by hand. When the blade is running properly, power up the saw and let it run for a minute or two to warm up the blade and tires, then cut the power and unplug the saw.

Next, back off the tension until there is just enough pull on the blade to prevent it from going slack and slipping off the tires. Usually this is going to be a little below the tension mark for a ⅛-in.-wide blade on the machine's built-in scale.

Raise the upper blade guide out of the way and lightly clamp the gauge to the side of the blade just behind the teeth (see photo 1 on the facing page). The measuring pin should be toward the back of the blade. Loosen the upper clamp and pinch a 0.005-in. feeler gauge between the measuring pin and the long block (see photo 2 on the facing page). Leave the tool in place, and tighten both clamps.

Now recheck the gap with the feeler gauge. It may change slightly from the torque of the clamps, but it isn't important that it be exactly 0.005 in. A starting gap of 0.004 in. or 0.006 in, will work just as well.

To tension the blade, begin by choosing a feeler gauge that equals the width of the starting gap, plus an additional 0.001 in. for each 6,000 psi of tension you want to apply to the blade. For example, if your starting gap is 0.005 in. and you want 15,000 psi of tension, start with a 0.008-in. feeler gauge (see photo 3 on the facing page). This is going to give you 18,000 psi of tension, but don't worry; it's going to be adjusted lower almost immediately.

With the 0.008-in. feeler gauge in hand, increase the blade tension while using the gauge to check the gap under the pin. When you reach 18,000 lbs., the feeler gauge is going to fit just under the pin. Once there, you can back off a little on the saw's tension adjustment to end up in the range of 15,000 psi.

Now you can mark your saw's tensioning scale at the pointer, noting the width of the blade. The recalibrated scale will allow you to tension the same-width blade quickly in the future without using the gauge every time. To guard against the spring becoming weaker, it's a good idea to use the tension gauge and feeler gauges to recheck the scale occasionally.

With a little practice, this little bandsaw tool will allow you to set the blade tension in less than five minutes. And with tension set just right, you can look forward to getting better performance from your bandsaw.

When he's not writing about woodworking, John White helps keep the Fine Woodworking *shop in tip-top shape.*

A spring with spunk

If you tighten the tension gauge on any small, consumer-grade bandsaw, such as the 14-in. Delta, there's a good chance you won't come close to reaching the 15,000 psi of tension that's recommended for resawing on these lighter-weight machines. With a ½-in.-wide blade, you're likely to find that running the saw's indicator off the end of the tensioning scale, beyond the ¾-in.-wide blade setting, increases the gap by only 0.001 in. (6,000 psi) or perhaps not at all.

If you continue to crank down on the tensioning knob, the gap (and the tension) is going to finally and suddenly increase but only because you've crushed the coils of the spring until they're touching. However, running the saw with the spring collapsed will damage the saw. That's because the spring also serves an important secondary function as a shock absorber.

A better spring. *The spring on a consumer-grade bandsaw (top) won't be able to apply as much tension as the aftermarket spring made by Iturra (bottom).*

If your saw can't reach 15,000 psi of tension, it's because the springs on these smaller machines go soft quickly, and a fatigued spring exerts far less force than it was originally designed to apply, no matter how far it is compressed.

The answer is to buy a new spring. Iturra Design in Jacksonville, Fla. (888-722-7078), makes one from a better grade of steel, and there's more of it, so it lasts longer. Plus it is stiffer, so you can add more tension. For $14.95 the Iturra spring is a good investment.

By the way, you can extend the useful life of any spring (and blade) if you remove most of the tension when the saw isn't being used. This is especially important with the Iturra spring. Just be sure to remember to re-tension the blade before turning on the saw.

SEE ERRATA AT END OF ARTICLE

Bandsaw tension-gauge clarification—In the article "Shopmade Tension Gauge" *(FWW #147.* pp. 80-83), the spacing between the clamps isn't mentioned. The clamps should be spaced 5-in. apart.