

Silver Brazing Your Own
**BAND SAW
BLADES**

BY JOHN WILSON

Save money and get better results by
making your own blades.

I was on the road teaching a woodworking course recently when my band saw blade broke. Not carrying a spare meant buying a replacement locally.

It had been 20 years since I began silver brazing my own band saw blades, and I had forgotten what a broken band saw blade means for woodworkers who don't. First, there is the inconvenience of stopping operations while shopping for the blade. Second is the cost. Third is the disappointment in the poor quality of the weld on the band.

My store-bought blade got me through my immediate need, but it soon broke. All these factors are improved by making your own band saw blades.

What must be the best-kept secret in the band saw market is worth your time to learn. Dependence on pre-dimensioned blades can be a thing of the past. What you need to know and the tools you use and the materials to make your own are all readily available. No special machinery, no elaborate instruction, no obscure source of supply.

You can make up your own band saw blades in 10 minutes using nothing more than a propane torch and a holding jig. Buy the same band blade material you are currently using from the same supplier and you'll save 50 percent to 70 percent. And you'll get back to work doing what you came to do in the first place – working wood in your shop.

Silver Brazing vs. Resistance Welding

There are two methods for splicing band saw blades: resistance welding and silver brazing. In welded blades, the ends to be joined are cut square and electric current supplies the heat to arc weld the butt joint. Silver brazing joins using a fill material of silver alloy. The surface area of the joint is increased by scarfing the ends back about $\frac{3}{16}$ ". The heat for joining the ends is from a common propane torch.

Silver brazing is not the same as soft soldering used in copper plumbing fittings. While both processes use solder, flux and torch heat, brazing is done at a higher temperature, and there is more strength in the band when the filler material is silver alloy. It is, in fact, as strong as the metal itself.

Silver alloys such as N50 or Easy-Flo 3 are examples available today that contain cadmium. Used for decades, we now know that the cadmium in them creates a health risk. Cadmium-free alloy such as BRAZE 505 (visit LucasMilhaupt.com for a brazing book you can download) contains 50 percent silver, 20 percent copper, 28 percent zinc and 2 percent nickel.

Just as with soft soldering, a suitable paste flux is needed to ensure joint surfaces that are free from oxidation. Both silver alloy and flux are available in convenient quantities from catalog stores. While the conventional propane torch is used for both soldering and brazing, the temperature range for silver brazing is much higher: 1,200°F to 1,600°F.

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Band Saw Blade Stock in the Coil

If the ingredients for brazing are simple and easily obtained, what about the band saw blade material itself?

Olson Saw Co., a major supplier of band saw blades, will sell blade stock in the coil directly to you. Most common types of blades are available, and at significant savings. You also can find other sources for band saw blades in coil form on the Internet (even at the auction site eBay.com) or through other suppliers. Other major blade manufacturers, such as Starrett, Lenox and Sandvik, provide blades in coil form. A large and user-friendly source is MSC Industrial Supply Co. (mscdirect.com), which carries Starrett and Morse brands. (Keyword search on the site for a list and price of different types.)

For example, Olson sells .014" x $\frac{1}{4}$ " x 6-tooth blades for fine work in a 100' coil for

about 50 cents a foot. Coils of .025" x $\frac{1}{4}$ " x 6-tooth blade is about 70 cents a foot. Olson doesn't mention the availability or price of the coils on its web site or in its catalogs; you need to call them.

In researching the article I asked folks in the band saw blade industry about this. Their answer was that their customers had been dissatisfied with the results of their shop-made blades. The solution, I suggest, is better information.

Steps in Making Up Blades

Here is how you go about saving money and gaining independence by making your own band saw blades.

1. Buy a coil of your favorite band saw blade from a supplier.
2. Obtain a "refill kit" for splicing your blade that contains silver alloy and flux from a catalog store.
3. Make a jig for holding the ends of the blade as shown on page 65, or buy one.
4. Cut your band to length (add $\frac{1}{4}$ " for the scarf joint).
5. Scarf both ends of the band on a belt sander to prepare them for joining.
6. Align the blade in the jig, add flux and a premeasured wafer of silver alloy into the scarf joint.
7. Heat the joint cherry red with a propane torch.
8. Anneal the blade with several passes of the torch to remove brittleness on either side of the joint.
9. File the joint smooth.

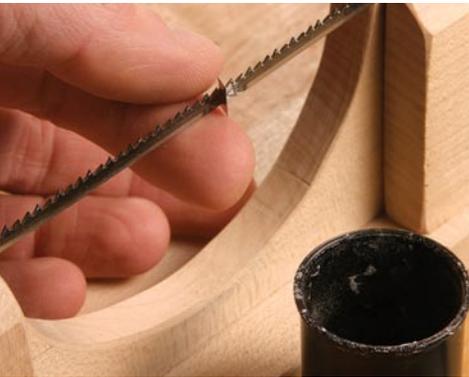
Let's take these steps one at a time. The sources of supply at the end of this article will help you locate the blades and materials you need. Silver alloy sells for \$25 to \$40 per ounce, and flux is \$6 in a 4-ounce jar. Both quantities are more than you will need, so it makes sense to buy a "refill kit" from a catalog store. What is significant to getting good results is knowing about what is called "ribbon solder." This is .003" thick by $\frac{1}{4}$ " or $\frac{1}{2}$ " wide. A page of this magazine is .003" thick to give you an idea of how thin this is. Cut it with paper scissors and make confetti-sized squares as a pre-measured unit for use. For a $\frac{1}{4}$ " blade a piece that is $\frac{1}{4}$ " x $\frac{3}{16}$ " is plenty.



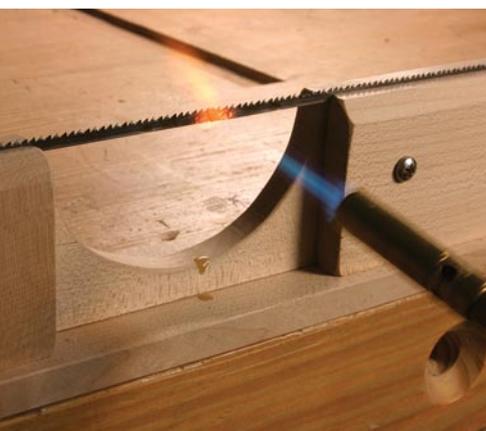
1 Cut your band $\frac{1}{4}$ " longer to allow for the overlap at the joint. Here we're using a belt sander to bevel one end of the band to create the scarf joint.



2 Align the two ends of the sawblade in your jig. Sight across the blade and use a screwdriver to tap the ends into position.



3 Place silver alloy in ribbon form between the two scarfed ends of the blade (above). Add flux to the joint using a small shop scrap (right).



4 Use a propane torch to heat the joint to a cherry red.



5 Remove the brittleness from the band by heating the joint using successively less and less heat. Back up the torch on each pass.



6 The final step is to file off the burrs at the joint and remove the glass-like residue left by the flux.

Cut a dozen such pieces and place them in the flux jar where they are ready for use along with the flux. Note: Flux contains zinc chloride and needs to be used with caution.

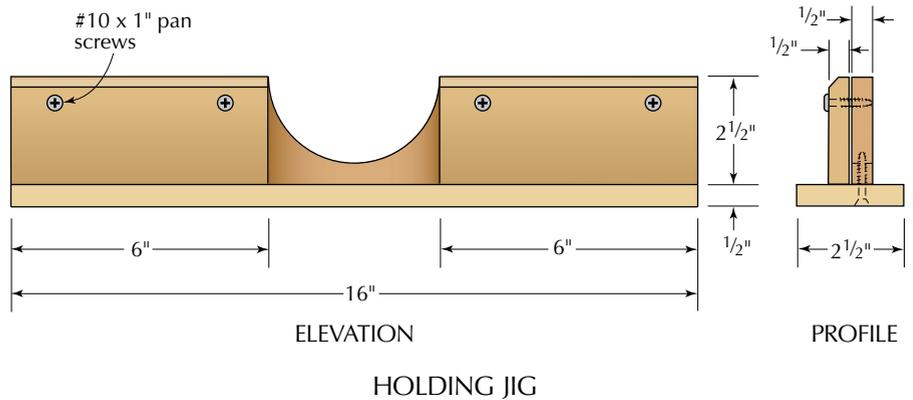
Use a scrap of wood to pick out the pre-measured silver alloy square along with a dab of flux. This is a more convenient and accurate way than using wire solder common in plumbing work. The refill kits differ in this regard. Woodcraft sells its joint kit for \$34.99 with a 10" length of wire silver solder and the refill kit for \$9.99 with the same length of wire. Lee Valley Tool's splice kit sells for \$32.40 and has a 7½" length of ¼" ribbon solder, while the refill kit at \$18.90 gives you a larger jar of flux and 38" of ribbon silver solder. This will do 150 splices. I rate this a good buy.

The holder for the band joint is easily made from ½"-thick hardwood. It will hold the two ends for brazing and gives you the opportunity to accurately align the blade by sighting along the top. This wood jig is intended for small blades and torches as shown in the article. A metal holder is used with larger torches and heavier blades requiring more heat.

Joining the Blade; Playing with Fire

After cutting the band stock to length (plus ¼" for the scarf lap), the ends need to be ground to a bevel angle back about ⅜" to ¼". Rather than do this at a grinder, I touch them on the belt sander. Visual inspection will guide you to making them even on both ends. Hold the blade so that the bevels are on opposite sides and mate when aligned in the jig.

The beauty of the ribbon solder will be appreciated as soon as you line up the band joint and have the ends touching each other. The wafer of solder and the small dab of flux



are held in place by the blade ends.

It is now time to turn on your torch. Silver alloy flows at about 1,200°F, and the joint will be heated cherry red in the 1,600°F range.

When it is fully hot the joint appears to have a molten shimmer to it. It takes less than a minute to heat. The joint is now brazed, but an important step remains: annealing. Heat makes the blade brittle. If you skip the annealing step, your blade will soon break near the joint where the brittle joint area meets the non-heated steel.

In annealing, the torch is used to accomplish a series of heatings to restore the needed toughness to the blade. Back the torch away from the blade an inch and apply a few seconds of heat across the joint area. Allow it to cool for about 10 seconds, and repeat four or five times more, backing away a bit more each time you swipe the joint. You want to heat the blade into the 400°F to 600°F range to temper out the hard brittle steel.

How do you know you have it right? Look carefully at the blade the next time it breaks. If the joint fails, then you have missed with the flux or given insufficient heat to the joint. If it breaks just beyond the joint, you have not properly annealed the blade. If it breaks elsewhere, then you have a stress fracture from the blade repeatedly flexing over the wheels of the saw.

Annealing in the Literature

If the instructions with the two splice kits are what people follow, it is not surprising that the technical support people at band saw blade companies report poor results from woodworkers making their own blades. Nowhere is there any mention of annealing the joint in either kit.

So I turned to the standard reference, Mark Duginske's "Band Saw Handbook" (Sterling). Both methods of making up a band are discussed. Here is what he says about resistance welding: "Before it can be used, you must

anneal it to restore the weld joint to the same metallurgical hardness and strength as the rest of the band. This is done by reheating it to an annealing temperature and then cooling it slowly." When discussing silver brazing, however, there is no mention of annealing after heating the joint with the torch to flow the solder.

One band saw blade manufacturer spent \$60,000 on the annealing machine for its blades. They guarantee the results. What you can do is the finesse of the blacksmith. It starts with knowing what needs to be done and how to do it. Then look at your failures and try it again.

The final step is to file the joint smooth. Surplus flux forms a glass-like bead on the metal that scratches off with the end of your file. You will appreciate the premeasured flake of ribbon silver solder at this step, because there will be very little surplus metal to be filed away as a result.

You can achieve consistently good results doing your own silver brazing. Moreover, you can make up a new band the moment you have a need for it in a matter of 10 minutes. In my book, quality and convenience rank every bit as high as the savings in cost.

Finally, you will come to appreciate that silver brazing is not just for repairing a broken blade. Don't believe the catalog descriptions. In fact, you may find that by the time your blades break there is little or no useful life left in them, which is testimony to your newfound skill. **PW**

Author's note: Thanks to Dave Hout for showing me this practical method for making up band saw blades. As shown, it works best on ½" and smaller blades rather than larger resaw and band mill blades.

John runs The Home Shop in Charlotte, Mich., which supplies wood, copper tacks and other critical supplies for the Shaker oval boxmaker. He also offers classes on a wide variety of woodworking topics. Contact him at shakerovalbox.com or 517-543-5325.

Supplies

For silver brazing kit and refill:

Lee Valley Tools

leevalley.com or 800-871-8158

Woodcraft Supply Corp.

woodcraft.com or 800-225-1153

For band saw blade stock by the coil:

Olson Saw Co.

olsonssaw.com or 203-792-8622

- blade stock in 100' coils

MSC Industrial Supply Co.

mscdirect.com or 800-645-7270

- Starrett and Morse blades in 100' coils