

# Double-bevel Artistry

BY JAMEEL ABRAHAM

A scrollsaw and simple steps yield stunning inlay results.

**P**icture a two-layer cake. Using a knife, cut a circle out of the middle while holding the knife perfectly vertical. You now have two cylinders of cake that you can easily pull out of the rest of the cake.

Now start again with a fresh two-layer cake, but this time tilt the knife handle in toward the center of the cake as you cut the circle. You now have two cones, each smaller toward the top of the cake, tapering to larger at the bottom. The top cone pulls out easily. (Feel free to eat that piece.) The lower and larger cone from the bottom half of the cake, however, you can pull up

only so far before it wedges itself in the top layer's conical hole. It fits so well, in fact, that it virtually disappears. That's because it exactly matches the shape of the hole, because both were cut at the same time.

That's how double-bevel marquetry works.

So how does double-bevel inlay work? Exactly the same way – but instead of using thin veneers, we're using thicker wood,  $\frac{1}{8}$ " thick and up. This allows us to do inlay precisely and accurately in thicker woods that can in some cases be used themselves as structural members of a project, not just



as veneer. The inlay can be as simple as an oval, or as complex as an elaborate fleur-de-lis. But oval is boring, so let's get fancy and French.

## Tools & Materials

This technique can be done by hand with a fret saw and angled platform, but it's extremely difficult to maintain the correct angle. I recommend a modern scrollsaw; not only is it convenient, it's the best tool for the job.

Get your saw tuned up and running smoothly, and wax the tables for free movement of your stock. You may also want a magnifying lamp or visor to aid in following your line. For anything up to 1/4" thick (total) I use 2/0 jeweler's saw blades. They cut slowly, but you can get incredibly crisp details with them.

First you need to gather your two materials. For this design I'm using pre-ban, reclaimed ivory (certified and legal of course) and rosewood. You can use any materials you like, but harder materials cut better, and denser materials hold detail better. If you want to start with more humble materials, any good-quality hardwood will work – and wood in wood looks great, too. (Holly is a nice light, uniform wood that works well.)

Prepare both the inlay wood and the background wood to the exact same

"Every artist was once an amateur."

—Ralph Waldo Emerson (1803-1882),  
American author and lecturer

thickness and size (plus a little extra length for test cuts.) For my fleur-de-lis, the thickness is about 1/8" for each layer. That also means my finished inlay is going to be 1/8". You'll need to join the two pieces together for the cutting, but only around the perimeter. You want the pieces to fall free as you cut each one out. On smaller pieces I use a dot of cyanoacrylate (CA) glue on each corner. For larger pieces I'll brad nail each corner, then clip the excess off and peen it down into the wood. This keeps the layers tightly together, and free to slide around the saw table.

Place the material you want for the inlay on top and the background material on the bottom. If the background needs to be much larger than the inlay (if, for example, you're inlaying a large rosette with lots of background space around the inlay itself) you can use a smaller piece for the inlay area. Use glue dots to adhere it in this case, because you don't want the extra nail holes.

## Design

Print out or draw your design on a piece of white paper. I typically sketch designs by hand, then refine them using drawing software. I print them out in the finest line weight, and in a gray tone. It may not seem as if it makes much difference, but if the line is something other than black, I can more easily see exactly where my saw is cutting.

After you have the drawing, glue it to the top of the inlay blank.

Now you're ready to start cutting.

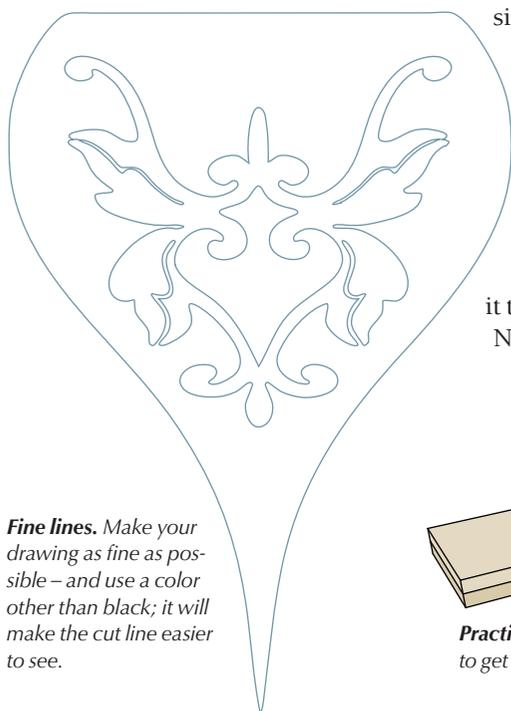
Almost. You need to set the tilt on your scrollsaw table to match the thickness of the wood and the width of your blade's kerf – and you have to do it by trial and error. Here's how.

## Set the Table

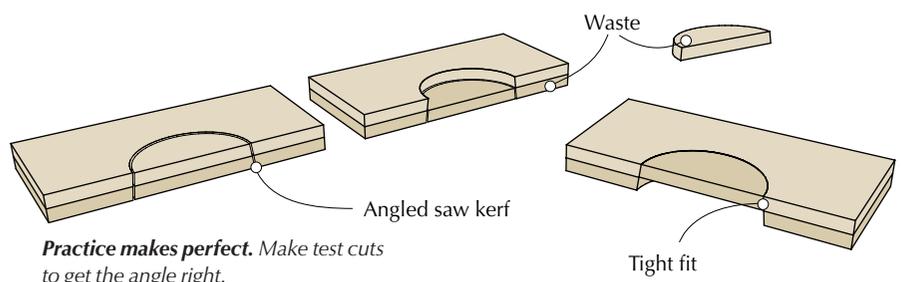
Set your scrollsaw table to a tilt of about 5°. Make a test cut. Make sure you feed in the correct direction so the background "cone" is larger at the bottom. Your saw table may tilt in either direction, and you may prefer one direction over the other depending on your dominant hand. (I usually tilt mine to the right; I'm right handed.) If you rotate your piece clockwise, the cone will be wider at the top, and the opposite if you feed counterclockwise (cone is wider at the bottom). This is important.

Because you may have your top tilted either direction, I'm not going to confuse you by telling you which way to feed. Simply cut a couple test pieces and it will become quite apparent. Sometimes you'll simply be cutting out a plain inlay without interior cuts – say, an oval of light wood set into a dark background. At other times you'll also be cutting out a design within that "oval." So first you'll cut out and "pull up" background pieces into your oval, then cut out in the opposite direction and "push down" the finished oval (with interior cuts) into the background. Again, you'll be cutting from both directions, because the background sections within the inlay will be narrower at the top (rising up into the conical cutout), with the inlay itself being narrower at the bottom (descending into the conical cutout).

If your test piece (the background) rises up into the inlay material and stops completely flush with it, you've nailed the angle. If the background



**Fine lines.** Make your drawing as fine as possible – and use a color other than black; it will make the cut line easier to see.



**Practice makes perfect.** Make test cuts to get the angle right.



**Inside passage.** Here's the background (the wood) and waste from an interior cut

piece goes past the inlay material and ends up proud or even passes completely through, the angle is not great enough – increase the table tilt by a degree or so and do another test cut. If the piece stops before the top of the inlay material and ends up recessed, the angle is too great – reduce it and make another test cut. Once you find the angle that works with a certain blade and material thickness, write it down so you can get close the next time without a lot of trial and error.

### Make the Cut

To begin cutting you'll need some starter holes. I keep them to a minimum: one in each interior cut, and one for the inlay itself. I use the smallest drill bit that allows the blade to pass through and drill them in inconspicuous places, such as acute corners. Use a drill press if you have it, or a small cordless drill. Don't use an eggbeater hand drill; you'll break the tiny bit.

In my fleur there is only one interior cut. In the picture above, I have the workpiece flipped over so the background is up. The white piece is the inlay material, so the white fleur is the waste piece. The rosewood piece is the background. You can clearly see the tapered cone shape with the two pieces removed from the cutout area.

Take the background piece and press it into the inlay material from the backside. This is the interior cut "rising up" into the inlay (in the picture above the workpiece is upside down). If you like, you can add a couple dots of CA glue as



**Mind the gap.** Cut the background piece then press it down into the inlay piece.

you press it in. You don't need much. I often glue the background pieces in place as I cut them out, especially on small, complex and thinly detailed pieces. This keeps the entire structure strong as you cut out more background pieces, and then as you cut out the inlay itself. You've probably surmised that thinner sections get quite fragile by the time they taper down at the back of the inlay.

In the picture below, I've glued in the background piece. It fits perfectly. Can you see the entry holes? (There is one at the very top of the interior background piece, and the one for the inlay is just to the right of it.)

Once the interior pieces are cut (again, mine only has one) you can proceed and cut out the inlay.

Remember: You're cutting in the opposite direction now because the inlay descends into the background.

If you were cutting counterclockwise, now cut clockwise, and vice versa.

As you cut, be attentive to the corners. With typical scrollsawing you can change direction by nibbling into adjacent waste material – not so much with this technique. There is very little waste material because you are keeping adjacent material (for the next layer, of course.) While you can get away with a little nibbling, it's best to simply keep moving and, if you do need to change direction abruptly, simply pivot in place and go forward.



**Tight fit.** If you have the bevel on your saw table set correctly and make a good cut, the background piece will fit flawlessly.



**Reverse direction.** To cut out the inlay, feed the piece to the saw blade in the opposite direction.



**Waste extraction.** Here's the inlay piece completely cut out. The separate pieces at the top are waste.



**Falling down.** The inlay descends into the background.



**Decorative cuts.** Extra kerf cuts make great shadowlines.



**Get ready.** Divide the components to prepare for the final assembly of the inlay.



**Interior fit.** Place the interior piece(s) in the inlay



**Background fit.** Place the inlay piece in the background material.



**Flush.** Now press the inlay firmly in place until it is flush.

The jeweler's blades are so small you can get by with more than you think. Take it slow. And run the saw slowly as well – almost as slowly as it will go, in fact, especially with harder materials.

With the inlay piece completely cut out, assemble the components. Place the inlay piece into the background and let it descend into place. But don't push it in tight. If it looks as if it's going in fine, immediately flip the piece over and let it fall out. The fit is so good with this technique that the fragile areas of the inlay may get wedged in if you insert it fully then remove it for the next step.

After all the double-bevel cutting is done, return the saw table to square and place a zero-clearance board on the scrollsaw for the next step, because you'll be handling the fragile piece. Cut decorative single kerf lines if your design includes them. (I like them because they add some shadow lines in the leaves of this design.)

### Assemble Your Inlay

Now separate the two original layers of material by cutting away the corners where they were joined by glue or brads

then get rid of the waste. You've probably realized that because of the double bevel, they won't fit together anyway (you can't have your cake and eat it too).

Assemble the pieces together using a few dots of CA glue on the inside edge of the cutouts. Because you'll be gluing this inlay onto a substrate – inlaying the inlay – you don't need much glue to hold the pieces together in the interim. If you are making a more robust inlay that forms a structural component in a piece, you should glue the entire inlay and background piece in place. But don't use too much glue; the fit is tight, and you don't want a glue line to appear in your finished work.

With the inlay in place you can see how perfect the fit is. Also notice how the grain in the background wood flows perfectly in line with interior piece.

You can now level the finished piece on a flat sanding platen (by hand of course). It won't take much if your bevel angle was correct; the pieces should automatically be quite flush.

The decorative kerfs in this piece were filled with fine rosewood dust and CA glue.

You can now cut out the background to your desired shape and even inlay it into another piece if you wish, as I did with this one, as shown in the opening photo.

The possibilities for decorative work with this technique are endless. With a little careful material prep and scrollsaw setup, you'll be rewarded with fantastic results. **PWM**

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### ONLINE EXTRAS

For links to all online extras, go to:

■ [popularwoodworking.com/aug13](http://popularwoodworking.com/aug13)

**PATTERN:** Download the pattern used for the inlay in this article.

**MODELS:** See the author's progression of SketchUp scenes that lead you through the double-bevel inlay process.

**BLOG:** Read the Benchcrafted blog for more from Jameel Abraham.

**IN OUR STORE:** "Creating Veneer, Marquetry & Inlay" DVD.

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