

Don't Fear the Hand-Cut Dovetail

For the first time,
a modern master reveals
every step of his system

BY CHRISTIAN BECKSVOORT

I've been working wood for more than four decades now, and I've always considered hand-cut dovetails the bedrock of my furniture. Nothing else so clearly indicates strength, quality, and craftsmanship. Starting out, I tried making dovetails in a variety of ways—cutting the pins first, or the tails first; chopping out the waste between kerfs with a chisel, or sawing it away with a coping saw; using a Western saw or a Japanese one. Gradually, I developed a system that gave me strong, well-fitting, aesthetically pleasing joints at a very good clip. Over the years, I've continued to refine my method in subtle ways. Mine isn't the only approach to dovetails, but I think you'll find it straightforward, efficient, and relatively easy to master. I'm going to cover every last tip and trick in a way I haven't done before, so this will be a two-part article.

Pins vs. tails

The first book I consulted on dovetails recommended cutting the pins first. So did my father, a European-trained cabinetmaker. So I did. But I soon tried cutting the tails first, and I found it both faster and more accurate. Cutting tails first, you can clamp the two tail boards together and cut them at once. You not only save time sawing, but you also increase accuracy, since the longer layout lines are easier to follow. I also think it's easier to trace the tails onto the pin board than the other way around, since the tail board can be laid flat while you trace it. Do pins first, and you have to hold the pin board vertically to mark the tail board. The transfer also is more precise when you do tails first, since it is done with a knife into end grain, the most accurate means of marking wood.

Mapping out tails and pins

The number and size of pins and tails has a huge bearing on the strength of a dovetail joint. The strongest possible joint would be 50% tails and 50% pins, but that is aesthetically boring and resembles a machine-cut joint. Narrow pins are just more appealing. But don't take it too far. If you spread six 1/8-in.-wide pins across a 10-in.-wide board, you'll be removing almost 92% of the wood on the pin board and just 8% of the wood on the tail board. That sort of ratio may work on a delicate jewelry box or a small desk drawer, but on a cabinet or a large drawer, those joints will be far too weak. As a



Part 1: Tails first

Two-part series starts with laying out and cutting accurate tails, the foundation for success.



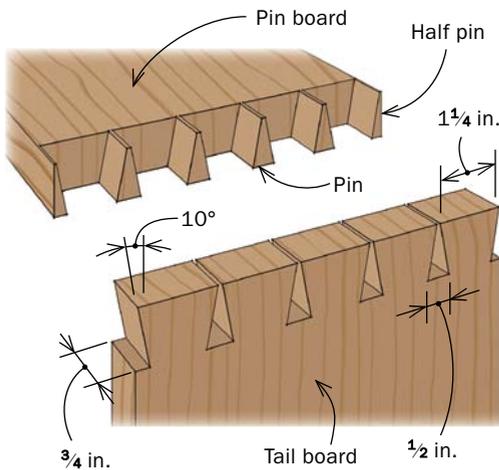
Layout

Becksvoort cuts both tail boards at once, so he only needs to lay out the dovetail angles on one of them.



ANATOMY OF A BECKSVOORT THROUGH-DOVETAIL

Becksvoort uses a standard chisel to lay out the pin sockets. His rule of thumb is to choose a chisel one size down from the thickness of the stock: for example, a 1/2-in.-wide chisel for 3/4-in.-thick stock. He multiplies the chisel width by 2 to 2 1/2 to get a rough idea for spacing between centerlines of the sockets.



SCRIBE THE BASELINE



Set the gauge. Adjust the marking gauge so its cutter just overhangs the pin board (above). The overhang will produce dovetails that are slightly proud. Scribe the baseline across both faces of the tail boards (right).



SPACE THE TAILS



Quick division. To space out five tails evenly, Becksvoort angles a ruler from 0 to 10 in. and makes a mark every 2 in. That gives him the centerpoints of the four full-pin sockets.

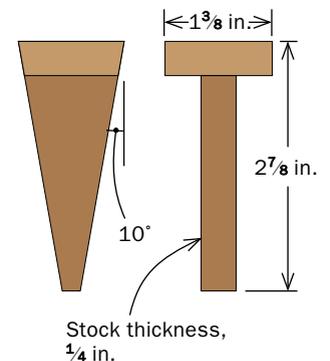


Transference. Use a square to transfer the center marks of the pin sockets to the end of the board.

MARK THEM OUT



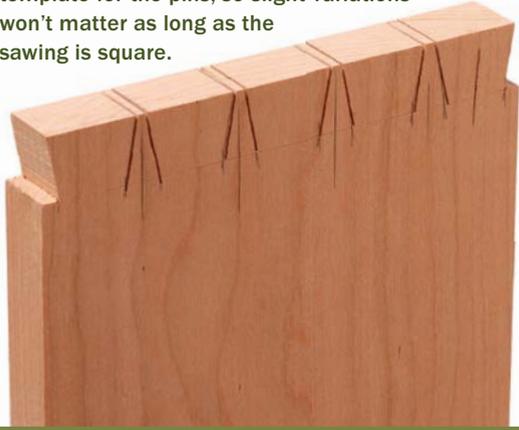
Chisel trick. Establish the width of the pin sockets by tracing the chisel you'll use to chop them. Using a fine pencil, mark across the scribe line on each side of the chisel (above left). Gauging by eye, make a mark for each of the half-pin sockets so they are roughly half the width of the full-pin sockets (above right).



The essential angle. Using a dovetail gauge, mark from the baseline to the end of the board, angling from the side mark toward the centerline. Becksvoort made his gauge to match a Shaker chest he admired.

Saw the tails

Cut right to the layout lines. The tails are the template for the pins, so slight variations won't matter as long as the sawing is square.

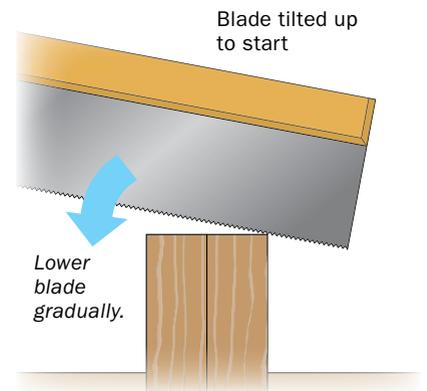


TIP

Pair up the tail boards. Clamp the two tail boards together in the vise with their sides and ends perfectly flush. Then carry the pin socket lines across the end grain of both boards. Cutting both boards at once improves accuracy, since the lines are longer and therefore easier to follow with the saw.



Perfect posture. It's best to saw with your feet slightly apart and your forearm horizontal. With longer boards, if necessary, you can stand on a stable platform that raises you to a comfortable position.



Start the saw with a light touch. Begin cutting at the far side of the line, with the saw's handle elevated. As you saw, gradually drop the handle until the blade is engaged right across the board.

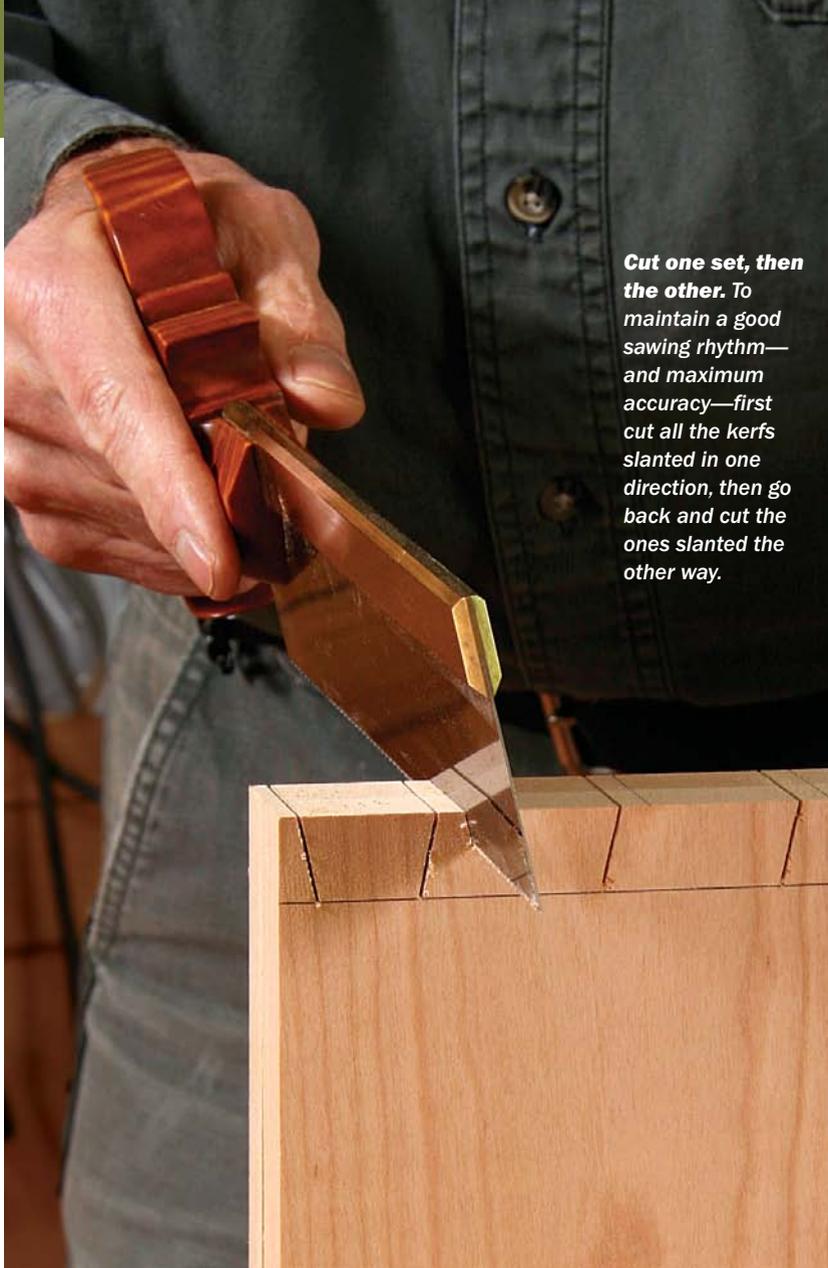
compromise, I remove 70% to 80% of the wood on the pin board and 20% or 30% of the wood on the tail board. Don't get too hung up on the angle of the dovetails. There are passionate proponents for dovetail angles ranging anywhere from about 7° to 12°, but the practical difference is minimal. Outside that range, however, things get iffy. Angles above 15° result in weak corners on the tail board. And with angles below 5° or 6°, the dovetail begins to resemble a finger joint, losing its distinctive appearance and mechanical strength. I borrowed the angle of my dovetail marker, about 10°, from the first Shaker piece I restored, and I've been using it ever since.

Layout

Scribing the baselines with a marking gauge is the first step in the layout pro-

cess. Any gauge with a sharp, knife-edge cutter will work. When I set the gauge, I let the cutter hang just over the edge of the board. This results in pins and tails that are slightly proud. Scribe both sides of both ends of all pieces.

Next, mark the centerpoints of the pin sockets. For efficiency, I make my pin sockets the width of a chisel ($\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, or $\frac{3}{4}$ in.). That way, they require only one setting of the chisel per socket. Use the chisel itself to lay out the sockets. Holding the chisel flat on the tail board with its blade crossing the scribed baseline and centered on the pin's centerline, draw marks on both sides of the blade. You can mark the width of the half sockets by eye. Then use a dovetail gauge and a pencil with a very fine point to draw the angled sides of all the sockets.



Cut one set, then the other. To maintain a good sawing rhythm—and maximum accuracy—first cut all the kerfs slanted in one direction, then go back and cut the ones slanted the other way.

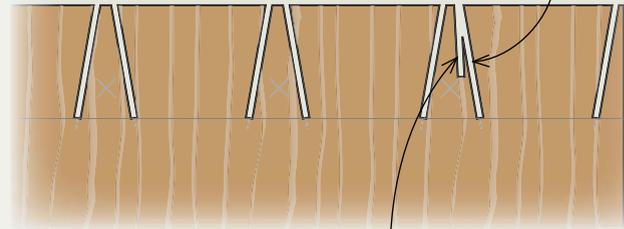
TIP



Oops. If your cut wanders far off track, start a new kerf parallel to the original pencil line. One of the tails will be slightly narrower than the others, but the angles will be consistent.

OFF TRACK? START ANEW

Make the new cut parallel to the original layout line.



Off-track kerf



Reclamp and re-mark. To mark and cut the shoulders of the half-pin sockets, turn the tail boards 90° in the vise, being sure to keep all sides flush.

Last, bring the two tail boards together, inside face to inside face, exactly flush on the sides and ends, and clamp them into a vise. Then use a square and a pencil to extend the layout lines across the end grain.

Sawing tails

Sawing to the line is usually the hardest part for most beginners. I recommend practicing on scrapwood until you learn the nuances of your saw and get a feel for its action. Stand comfortably, feet slightly apart, facing the boards. Optimally, your forearm should be horizontal.

Start the cut with the sawblade resting at the back of the square line and the handle slightly elevated. A light touch is required to start the cut. Just keep the saw moving, with no downward pressure. Then, as you saw, drop the handle of the saw so that

you are cutting a full kerf along the pencil line. Once the kerf is established, slight downward pressure can be applied. Hold the saw at the same angle as the dovetail line and saw down to the scribe line. I like to saw all the right-tilting angles, and then go back and saw the left-tilting ones, so I can get into a rhythm and let muscle memory take over.

Before putting the saw away, cut out the waste in the half sockets. It is definitely worth the time to reposition the boards so they are horizontal in the vise, since a vertical cut is much easier to make.

Chopping between the tails

With both tail boards sawn, stack them on the bench, like stairs, and clamp. When making multiple drawers, I will stack up to six pieces at a time. This saves wear and



Make it easy on yourself. Repositioning the boards is worth the trouble, since a vertical cut is much easier to make accurately.

Chop out the waste

Becksvort takes a quick route to a flawless shoulder. Instead of trying to make a perfect shoulder the whole thickness of the workpiece, he makes a shallow shoulder right on the scribe line and then undercuts it.



tear on the arms. Constantly reclamping takes time and energy. If you clamp six pieces at once, for instance, you only have to clamp four times. Clamp those same six boards individually, and you'll be clamping them 24 times!

Some folks like to stand, but working that way is hard on the back. I prefer to sit while chopping. The work should be at lower chest height, so your forearms are almost horizontal. A shop stool of the right height is essential.

I chop away the waste in two distinct steps: First I create a shallow, square shoulder on all the sockets; then I go back and remove the bulk of the waste with angled, undercutting strokes.

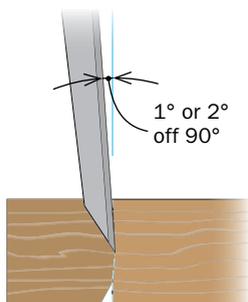
Begin by placing the layout chisel directly in the scribe line between the two sawcuts. Hold it at 90°, and give it one light tap with a mallet. Although the chisel is flat on the back, it is

GO LIGHTLY AT FIRST...

Start straight up. Using the same chisel you used to lay out the pin sockets, seat the tip of the blade in the scribe line, hold the chisel perfectly vertical, and give it one light mallet hit (left). This creates a 90° shoulder right at the scribe line.



Pop out a slim chip. After lightly chopping all the pin sockets, use a narrower chisel to remove the top layer of waste wood with a tap into the end grain. The shoulder should now be about $\frac{1}{16}$ in. high.



Angle in for safety. Make the next series of chops using heavy mallet blows and holding the chisel so it angles toward you a degree or two. This undercuts the shoulder without changing it.



THEN GO HEAVY



Halfway home. Remove the thick waste chips (above) and then resume chopping with the chisel angled. Continue chopping to the halfway point in the board's thickness.

FINISH UP

Flip and repeat. Turn over and re-clamp the boards to chop in from the other side. Start with light, vertical chops as before, followed by heavy chops at an angle. Be careful not to strike the last waste too hard, as the chisel could damage the shoulder below.



Knife work. Use a sharp knife with a narrow blade to clean up the tight corners of the pin sockets.

still a wedge, and too heavy a hit will widen the scribe line in both directions. Go up the stairs, making light hits on all the pin sockets. Then, with a narrower chisel, held horizontally with the bevel up, hit into the end grain to remove a chip of waste about $\frac{1}{16}$ in. thick. This will leave you a nice, square shoulder directly on the scribe line.

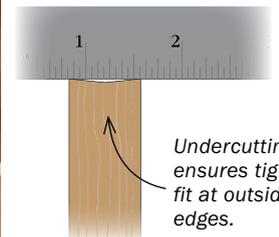
Then comes stage two. Returning to the layout chisel, place its tip against the shoulder you've created. Tilt the handle toward you by a degree or two, and give it two hard hits with the mallet. This will undercut the joint slightly and ensure that the pins, when cut, will be tight against both inside and outside shoulders of the pin sockets. I use a chisel with very narrow flats on the sides to keep from deforming the tails.

Chop all the sockets this way, and then, with the smaller chisel, go along and remove a chip of waste about $\frac{1}{8}$ in. thick from each one. Continue until you reach the center of the board. Then unclamp, flip, and re-stack the boards. Perform the same two-stage operation on the other side. As you approach the center of the joint, use light taps instead of heavy ones until the waste pops down and forward. If you're not careful, you can ruin the shoulder on the other side and hit the workpiece below.

Since the sawcuts are at about 80° and the edge of the chisel is at 90° , there is usually a small bit of waste wood left in the corners of the pin sockets that needs to be removed. Use a sharp, narrow knife to clean these corners. Finally, place a chisel or a square across the inside of the sockets and sight across it to be sure that the joint is properly undercut—low in the middle and with the shoulders as the high points.

At this stage, if you've sawn square across and straight down to the scribe lines, and chopped correctly, you're still on track for a perfect dovetail. The tail boards you've produced are the templates for the next step. Keep practicing your sawing until the next issue. □

Christian Becksvoort is a contributing editor.



Undercutting ensures tight fit at outside edges.

Straightedge tells the tale. With the center of the shoulder undercut, a straightedge laid across the joint should contact only at the outside edges.

Part 2: Finish with the pins



In the next issue (FWW #239), Becksvoort will explain how he marks and cuts the pins, and how he assembles the joint.