

Compound angle dovetails

If you're following our joint making series then you might want to try something a bit different, says Michael T Collins

A couple of summers ago I was staying with my sister in England and she had just purchased a very nice antique cutlery tray with what appeared to be dovetails. However, on closer examination they were, in fact, faux dovetails – mitred corners with dovetail keys cut into them.

I thought it would be fun to give a step-by-step on how to cut real compound angled dovetails. If you have made through dovetails (issue 27, page 68), then a compound dovetail is a joint that will really tax the mind on many levels. But, as my wife said, they are really beautiful and therefore worth mastering.

The really hard part of making compound angle dovetails is figuring out all the angles.

Let's start by relaxing and, more importantly, not over-thinking the process. This is one of those skills that is easier to do than it is to think about and, while I taught mathematics in a previous life, calculating these compound joints is an exercise in complex geometry and trigonometry and woodworking should be fun. So I promise, no maths.

1 When making regular through dovetails, the pin and tail boards are at 90° to each other, and it's easy to take a lot of the process for granted. For example, we think of the pins being perpendicular to the end of the board, but actually they run parallel to the top and bottom edges of the board. Similarly, the base line or shoulders of the tails and pins we square to the face, but they are really parallel to the end of the board.

It's important to understand that dovetail angles must be visualised relative to the edges of the board, parallel with the grain, and not perpendicular to the shoulders. The reason they look a little odd is because of the side's splay angle.

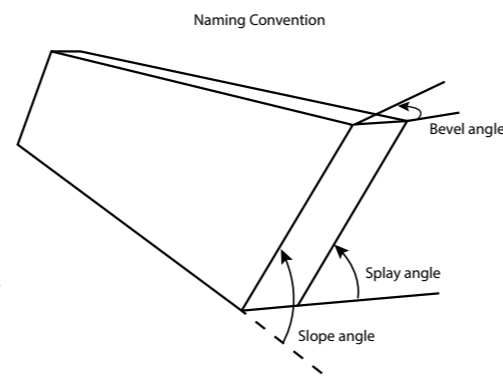
So, let's take this step by step

In this article I will be making just a single joint, using 20mm-thick pine to illustrate the process.

A butt joint

It all starts with a butt joint. First cut your boards to the length that you want the top edge of the tray to have.

Mark which is the tail and which is the pin board, the face and edge side,



inside and up. This is important – I can't stress this enough.

Next, decide on the angle that you want the sides to lean (the splay angle) – the tray that my sister has is angled at approximately 20° from the vertical or 70° from the horizontal.

2 Dial this into the tablesaw and rip the bottoms of all the boards with the word 'in' facing up.

As I promised, no maths will be used in constructing this joint.

3 To determine the height of the sides, place the bevel you just cut

on the bench, then at one end measure the perpendicular height to where you want the top of the tray. In my example, I marked a point about 75mm from the bench. If you are leaving the top flat, that is all you need to do, but if you are going to round over the top edge you will need to allow for this extra height by measuring to the middle of the top edge.

Now, rip all the boards to this width ('in' will now be down). You should now have four boards that are parallelograms in cross-section.

Finding the intersection angle

4 Take a tail and pin board and place them at 90° to each other (I used a couple of blocks of wood to support them while I found the slope angle), so that the outside top of the tail board is in line with the end of the uppermost edge of the pin board.

With a card scraper resting on the tail board, slide it towards the mating pin board and then draw a line along the edge of the card scraper – this is the projection of the tail board on to the pin board. Since the splay angles of the tail and pin boards are the same in my example, I now have the angle that the ends of the boards need to be cut. If you wanted different splay angles for the tail and pin boards, simply repeat the process, but this time project the pin board on to the tail board.

5 Set a bevel gauge to this line and this will be the line on which you cut. You will see that this angle is not the same as the splay angle.

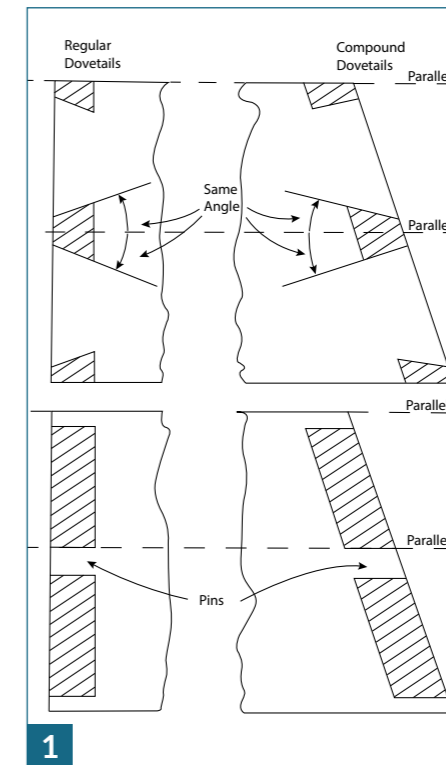
6 Using your method of choice cut along this line. Retain the waste piece – we'll need it in a bit.

7 Now when you put the tail and pin boards together at 90° you will discover that the boards leave a small gap on the inside...

8 ...or, if you tightly butt them together, they will not be at 90° and will be out of square by the amount that needs to be bevelled on the ends.

9 In my example, the bevel angle was a tad under 7°. Set a bevel gauge to this angle.

The easiest way to remove this small bevel is with a shooting board. My shooting board is just an over-sized bench hook. ▶



Faux dovetails – actually dovetail keys

PHOTOGRAPHS BY MICHAEL T COLLINS

10 You will need two setup blocks, one was the piece you cut off the pin board and the other is a wedge that has the bevel angle (fig. 10 shows a selection of blocks for different splay and bevel angles). Note: There are several online calculators to determine these splay, slope and bevel angles, but I find it just as easy and effective to measure the angle by eye.

11 Mark the extent of the waste on the ends and, with the shooting board and the two blocks, plane away the waste. Your shooting board will need to have two sides so that you can plane the bevels on the other end of the boards.

12 A pencil mark on the end grain is a good visual cue to see when the bevel is planed away.

Laying out the dovetails

13 I am a proponent of tails first so, with a marking gauge, measure the width of the end of the board. Owing to the bevel edge, this is marginally longer than the actual thickness of the board.

14 It is important to realise that when marking the shoulders on the faces, they will be at the different locations on the front and back face sides due to the bevelled end. So, when marking the inside shoulder make sure that the marking gauge is seated flat on the bevelled end. Scribe the line on all four sides of the tail board and only the face sides of the pin board.

Tail layout

15 If you have not labelled your parts at this juncture now is the time to do so.

16 Set the half-pins at 6mm from each end. To mark the tails, set a pair of dividers to a quarter the distance between the two half-pins plus 3mm. Starting at the first half-pin mark, walk the dividers across the end grain. Place the divider in the other half-pin mark and walk back – this involves a little trial and error. The marks will represent the edges of the dovetails. If you don't like the layout simply change the divider length. I rather like having very narrow pins 'English' style.

17 Now, with the bevel gauge set to the angle of the bottom proceed to draw the edges of the tails across



10



11



12



13



14



15



16



17

the end grain. Note that these lines are parallel to the bottom and top and not perpendicular to the face sides.

Getting the tail angle

18 I like my tails to be at an angle of 1:6 or approximately 9.5°. The easiest way to get the angle of the tails is to draw a line parallel to the sides and then mark off 1:6. You will need to set one bevel gauge to the left-hand angle and one for the right-hand angle.



18

19 Draw in all the tails. Place the tail board in the vice so that the tail's layout lines are perpendicular to the bench – this will aid in sawing. Normally when I am making dovetails, I gang the tails together and cut them all at once, but in this case that is not possible as the shoulders are at different locations.

Because these shoulder lines are at different heights, work from the shorter side (the outside) – that way you can cut close to the shoulder line without going below on the other side.

20 Mark all the waste on both sides of all the boards and saw down to the line on the waste side.

21 Then, proceed to cope out the bulk of the waste. Repeat this for all the other tails.

22 Chop out the waste but go easy and remember that the chisel does not chop perpendicular to the board's face, but at the bevel angle. If this is your first time, resting the chisel on a block of wood cut to the same bevel angle will help.

Pin layout

23 Now for the pins. Lay the tail board on the pin board and support it while you mark the location of the pins.

24 With a bevel gauge set parallel to the sides draw the pins and mark the waste.

25 Chop out the pin waste.

26 Test-fit and pare away any tight areas. Now all that remains to do is make the other three joints. This is the time to round over the top of the boards and cut the groove for the bottom.

27 Once glued, the joint is easily cleaned up by using a smoothing plane working from the joint to the middle of the sides, this avoids tearing out the tails and pins.

28 If you would like to start on something 50% easier, leave the tail board at 90° and just slope the pin board or vice versa. ■



19



20



21



22



23



24



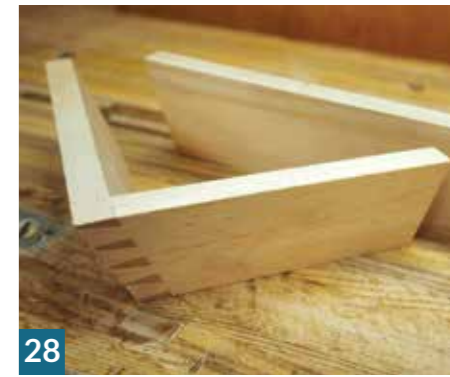
25



26



27



28