
TRADE SECRETS

MAKING A MOULD

In the first of a new series of technical articles written by makers, **John Dilworth** reveals some of the tricks he's developed over the years

This is not rocket science. It is not cutting edge research into authentic methods. It is simply a method I have developed over the years for transforming instrument drawings – of the type featured in The Strad posters – into reasonably accurate three-dimensional forms which can comfortably be used for a series of reproductions.

There are a million ways to make a fiddle and all makers have evolved little methods and techniques that they feel comfortable with. This is my approach to making a mould, an internal form. I often make one-off copies, but I still like to use a mould approximating to the Cremonese original, so that I can make further copies of a particularly successful model. I therefore make an enormous number of moulds and this requires a pragmatic approach.

My workshop is not the most highly mechanised and technologically sophisticated in the world; nor is it a shrine to the 18th century. Tedious, mechanical work is often best left to machines. If you are a fan of serendipity and chance in the making of a truly artistic instrument then rest assured; there's always plenty that can go wrong. It's simply that with a machine it's more likely to be catastrophic. But I could not imagine my workshop without the bandsaw, drill press, disc and spindle sander; and a face mask and ventilation system.



Prick the outline of the instrument through the drawing on to the plywood

1 We start off gently, pricking through the drawings on to a sheet of aero-quality 0.8mm plywood. This is lovely material, very dimensionally stable and easy to work with. I get through a lot of the stuff and order it in 180 x 120cm sheets from architectural suppliers or from my local model shop if I'm in a hurry. Put on some nice music, fill a glass and settle down.

It's slow and painstaking work; very meditative and therapeutic. You have to check the original drawing against all the available measurements, compensating where necessary for worn areas on the original instrument, and compare it with other examples by the same maker. Unless it's your own original design, of course. The ply is easy to cut. Use scissors at first, then trim up to the final line with a knife and finish it with a stiff-backed abrasive paper that will preserve the flow of the curves.

Photos: Tille Dilworth



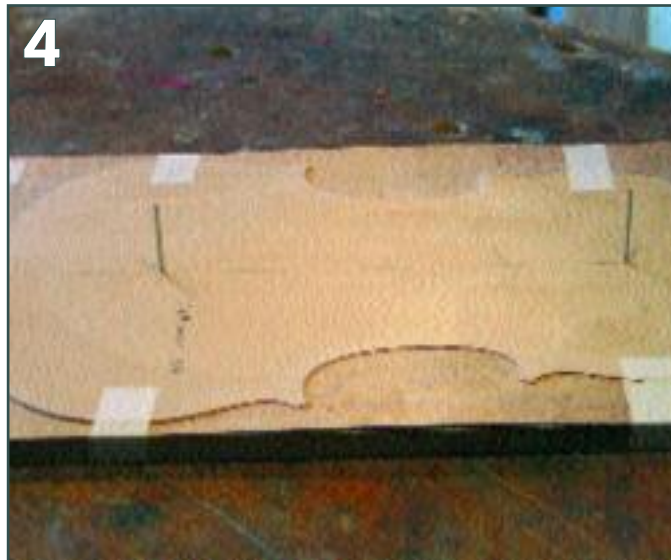
Mark a centre line on the finished template

I aim at bisecting each individual prick-mark and am constantly referring to the measurements and overlaying the original drawing to check the line. This template represents the final external outline: any error here will be built into the finished instrument.

2 Mark a centre line on the finished template, then prepare a block for the mould from MDF (medium density fibreboard). This is great stuff, so long as you don't need to breathe. It also wrecks edge tools, which is why I work most of it with abrasives; but it is flat and stable, has no grain-splitting problems and comes in convenient thicknesses. Twelve millimetres is perfect for violins, sixteen for violas. Make sure you ventilate the room and wear a mask when working it. The dust is quite bad for you.



Tape the templates together and drill the positioning holes



Pin the three layers together using 1/8in drill blanks



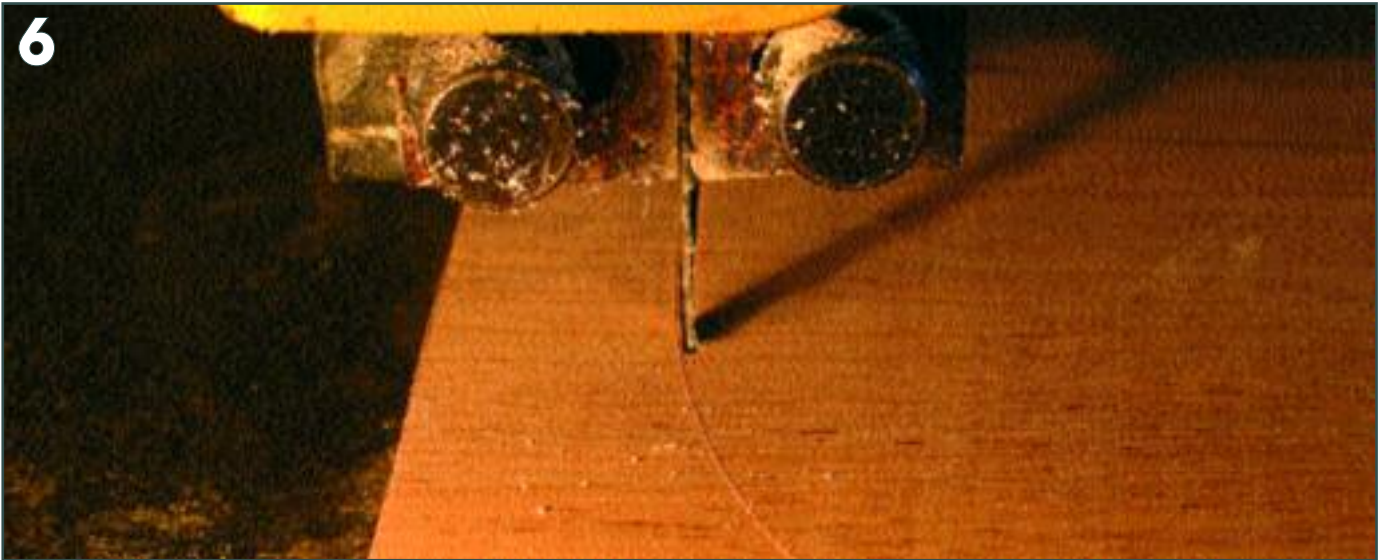
Trace round the outer template with a sharp knife, marking the inner template beneath it

3 Next I place another sheet of 0.8mm ply on top of the mould block. This will become the inner template. It should be taped to the block and worked with it. I tape the finished outer template on top and drill 1/8in positioning holes in the middle of the upper and lower bouts using an accurate drill press.

4 Now the three layers – the outside template, the sheet for the inner template and the mould block – should be pinned together using 1/8" drill blanks. These durable, straight pieces of steel rod can be obtained from engineering suppliers and anchor all the parts together so that everything can be taken apart and reassembled at any time.

5 The next step is tracing around the outer template on to the inner template sheet that is pinned beneath it. I do this with a sharp knife rather than a pencil, for accuracy, but you have to be careful not to cut your finished outer template.

I now remove the outer template, leaving the inner template sheet pinned and taped to the mould block, clearly marked with the shape of the outer template. If any bits have been missed or are unclear, you can easily drop the outer template back on to the pins to make corrections. ▶

6

Remove the outer template and cut inside the line, through the inner template and mould block

7

Use the purfling tool to mark the final cutting line on to the rough-cut inner template

8

The remaining material can be removed from the concave curves with a spindle moulder

6 With the outer template removed and tucked away safely, I put on my face mask, switch on the extractor and head for the bandsaw. The trick is to cut inside the marked line, through the template material and the mould block, doing two jobs at once. You should end up with a mould and template that are both slightly smaller – by the saw kerf – than the finished outline. We now have a rough-sawn inner template and mould block. The next step is a little sneaky. I take off the inner template, place the finished outer template back on to the mould block, over the pins, and then put the rough-cut inner template back on top, securing everything with tape. Small squares of double-sided tape tucked between the pieces are more effective, but you can see the process more clearly this way.

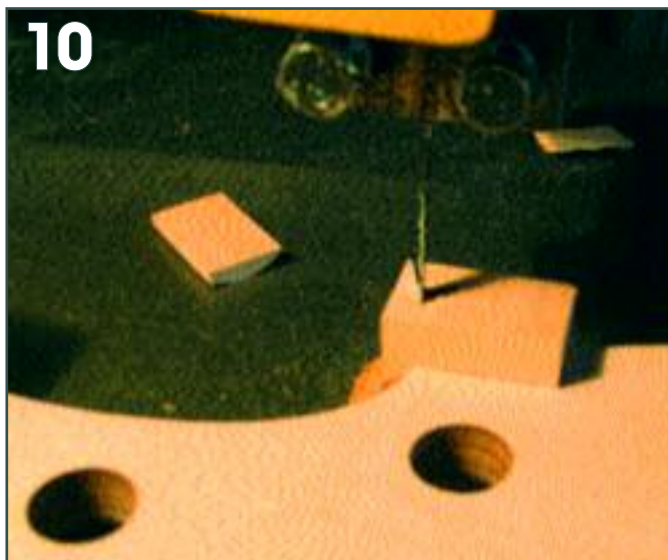
7 Now do the calculations for the final size of the mould. This is simply the desired overhang plus the thickness of the ribs. If you're copying an instrument the overhang may vary as you go round the edge, particularly in the corners and between the middle bouts and the upper and lower bouts. Once these measurements have been settled, set the purfling tool with a single blade. I can now mark the final cutting line on to the rough-cut inner template with my purfling tool, by running around the edge of the outer template, which is still projecting slightly from the mould block.

8 Remove the outer template once more and you can now cut the final inner template together with the mould. If a lot of material needs to be removed then I go back to the bandsaw. If not, it's a matter of files and rasps or, even better, my spindle-moulder for the concave curves and a disc sander for the convex ones. Using fine paper that's preferably pretty worn as well, I can work very accurately with these machines. As you approach the knife line, a small burr develops. When it falls off, you are right on the line. Stop.

You now have a very accurate, squared edge. It is best to go through all the checks again, with a set-square, callipers and the original drawings to hand. Any little irregularities in the edge that reveal themselves under the fingertips must be smoothed out with a file. ▶



The finished mould and templates



Rough saw the blocks on the bandsaw



Have the nylon cord handy when you're fixing the ribs

9 I now have an accurate mould, with inner and outer templates which can be fitted together over the pins with accuracy. It is a very quick process, compared with preparing a board of mahogany or walnut and cutting it by hand.

10 All that remains is to drill clamping holes through the mould with a suitable Forstner bit and cut the mortices for the blocks. With the mould supported to half the finished rib height, the rough blocks are glued on.

Drop the inner mould down over the pins and trace the cutting line for the blocks. By tapping the pins through the mould, I can then turn it over and place the inner mould on the underside, so that I have cutting lines on both sides of the block.

Rough saw the blocks to shape on the bandsaw; the off-cuts provide the clamping counterparts for the ribs. I do the final shaping of the corner blocks with an internally ground gouge and use a chisel on the upper and lower blocks. It is straightforward to cut straight from the marked line on both faces of the blocks.

11 Although I'm totally reconciled to noisy machinery in the workshop, there are still 18th-century methods that are very useful. Fitting the ribs to the mould is a job that requires a minimum of three hands, but a good length of string is very useful. Modern nylon cord is even better as it is slightly elastic. After I have glued the upper and lower ribs to the top and bottom blocks, I whip the whole assembly with cord, making sure it runs only along the middle part of the rib where it is supported by the mould. Two or three turns around the whole thing are usually enough to bring the ribs tight against the mould, but a tourniquet or wedges can be used if the bending iron has not done its job perfectly. Then you have both hands free to knife hot glue on to the corner blocks, slip the clamping counterparts in behind the chord and tighten the clamps. No fuss, no panic. ■

In next month's Trade secrets Shem Mackie shares his method of making a Baroque neck