Issue 314 • January 2017

Good woodworking

www.getwoodworking.com

The No.1 magazine for aspiring designer makers

WIN! MAKE A PIECE OF FURNITURE & BE IN WITH THE CHANCE OF WINNING 1 OF 3 FANTASTIC PRIZES

WITH 60 YEARS FELDER

CHRIS TRIBE'S STORY

Woodworking & furniture making courses for all, plus a brand-new book

PART 1:

MAKE YOUR OWN MEDIAEVAL FIDDLE

Shaun Newman's expert guide

EXCLUSIVE! We announce all the winners of the 2016 Wood Awards

WA TheWoodAwards

PLUS...

- Beginners' guide to using powered planes
- Simple project: build a toy wooden aeroplane
- Les Thorne's textured & airbrushed cenote bowl

9 770967 000160 14

ONLY £4.50

Making mediaeval music PART 1

The mediaeval fiddle emerged in Europe in the 10th century and musicologists believe it derived from the Byzantine 'lira'. Here, in the first of a two-part series, **Shaun Newman** shows you how to make your very own version

Many people think of the modern 'fiddle' as some sort of inferior violin, which is very sad, as it has a long and proud tradition. Although some see it simply as an addition to a folk or bluegrass band its origins are deeply rooted in sacred and revered church music. It seems to me a shame that the term 'violinist' appears to hold greater esteem than 'fiddle player'.

The mediaeval fiddle emerged in Europe in the 10th century and musicologists believe it derived from the Byzantine 'lira'. The lira was a relatively small bowed instrument with just three strings and a teardrop-shaped body. It was probably played upright rather than under the chin, which can be seen in a famous carving onto an ivory casket held in the Museo Nazionale in Florence, which dates from between 900 and 1100 AD.

The 'lira' from ancient Greece

The carvings at the Portico de Gloria Compostela

The fiddle that is the subject of this article can be dated from before 1211 as it is depicted in stone carvings over the 'Portico de Gloria' in the cathedral of Santiago de Compostela in northern Spain, which was finally completed in that year. It too has three strings as did the lira, was bowed and was probably played upright.

The Portico was commissioned by King Ferdinand II of León and as it is behind the main entrance to the cathedral the carvings have been protected from the weather and are well preserved.

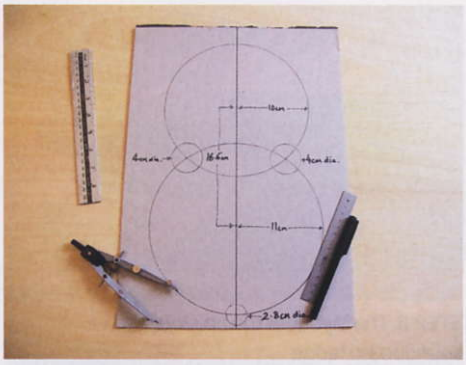
I owe a great debt of gratitude in putting this series together to the famous English early musical instrument maker Ronald Zachary Taylor who personally visited the cathedral, took measurements of several of the carvings and wrote them up in his book *Making Early Stringed Instruments*, which was published in 1991. My version of the fiddle depicted in the Portico is not identical to his, as I have brought some of my classical guitar making experience into the equation, including the 'slipper/heel' construction method (also known as the Spanish method). More on that later, but now 'to work!'

Timber & tools

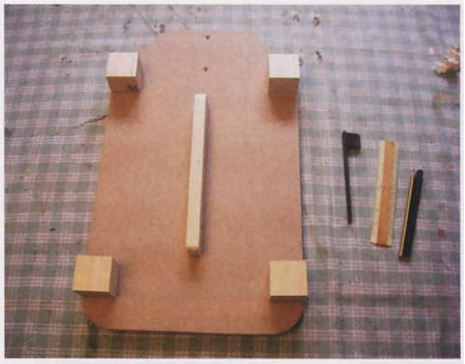
It is impossible to say what the original fiddle depicted in the Portico was made from; however, it is most likely that common European woods, such as maple or walnut, perhaps cypress or sycamore, would have been used for the back and ribs (also termed 'sides'). The soundboard (also termed the 'front') would probably have been made from spruce, and the neck a common hardwood. For this instrument I chose to use padauk for the back and ribs, simply because

it has a striking grain and is very strong – and I had some in the workshop! I used Alpine spruce for the soundboard and cedar for the neck with rosewood for the head facing, the tuning pegs, the bridge, and the tailpiece.

The only specialist tools needed are some sort of bending iron and a violin peg reamer, or similar, with around a 1:40 taper. Bending irons are quite expensive, but homemade versions using a cast-iron pipe around 300mm long and 60mm wide heated with a blowtorch or similar (e.g. a hot air paint stripper) will perform adequately. There are several guides to making your own bending iron on, for example, YouTube, and in several publications on musical instrument making (see suggested reading at the end of the article). Great care must be exercised in their usage as it is very easy to scorch the timber. Luckily, any bending only takes place on the surfaces facing inwards to the instrument so any burn marks are out of sight. Other than the bending iron and reamer all other tools should be found in the workshop or are easily available.



STEP 1. The card template



STEP 2. The underside of the workboard

The template & workboard

A template should first be drawn onto a piece of card (**Pic.1**). The card I used was from an old A3 sketchpad, and was stiff enough to use to transfer the outline onto a flat workboard. Once the lines are in place, the workboard also acts as a plan.

The shape of the instrument is determined by two circles that overlap each other. The circle for the lower bout has a radius of 110mm and the one for the upper bout 100mm. In the original stone carving the two circles share the same radius, but as a guitar maker it seemed 'top heavy' to me if constructed in that way, so I made the upper bout a little smaller than the lower. The centres of the two circles are 165mm apart, sitting on the centreline of the template. The two circles at the waist of the instrument have a radius of 20mm, and represent the position of the rib blocks. The smaller circle at the lower end of the template has a radius of 12mm and is where the tailblock will sit.

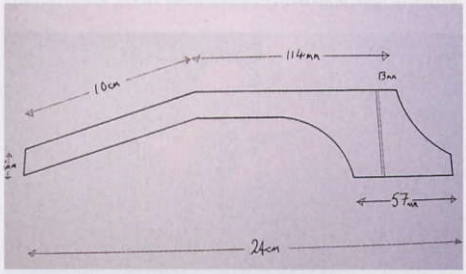
The workboard is made from 18mm MDF and has four blocks glued onto the underside so that cramps can reach underneath when the instrument is being built on the bench, and in particular when the back is fitted. The centre brace to the underside of the workboard is so that it can be held in a vice during the construction of the fiddle (**Pic.2**). Please note that later on I have drawn two circles each for the upper and lower bouts onto the workboard. This is to show the exact position of the ribs. The dimensions given earlier are for the outer of the circles.

Pieces of clear adhesive tape should cover those areas where the ribs will later fit the neck and blocks to avoid getting attached to their workboard through glue squeeze out.

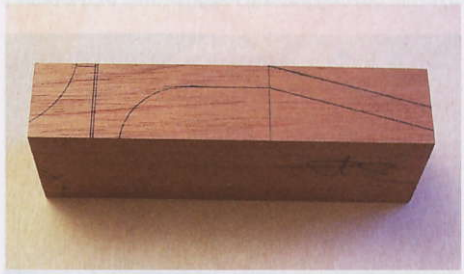
Making the head & neck

The exact method of construction of the original is a matter for speculation. As mentioned earlier, I decided to use the time-honoured Spanish guitar maker's 'slipper heel' approach, which makes a very strong join where the body meets the neck. The method will become clearer as we move forward.

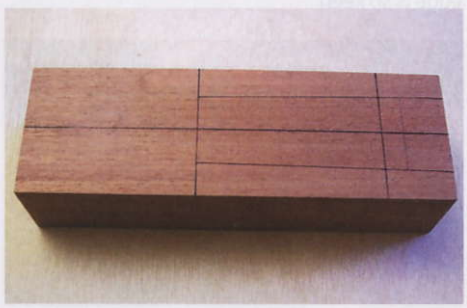
A cedar billet is first prepared. It is planed all around and finished to a length of 235mm, 80mm wide and 50mm deep, then the layout of the head and neck should be drawn onto a card template (**Pic.3**). The head face is 100mm long and 80mm wide. The slipper/heel face is 570mm long. The distance between where the >



STEP 3. The head and neck template



STEP 4. The head and neck outline transferred onto the cedar billet



STEP 5. The outline of the fingerboard transferred onto the cedar

STEP 6. Using the bandsaw to cut the rough shape of the head and neck

STEP 7. Planing the head face true

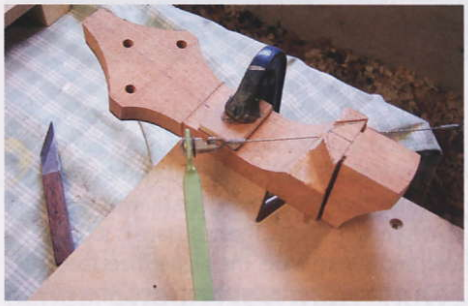
STEP 8. The layout of the rib slots and soundboard ledge

STEP 9. Cutting the 2mm rib slots

top nut will sit and where the neck will join the fiddle soundboard is 100mm. Seen edgeways on, the shape of the head, neck and heel are drawn onto the side surface of the cedar (**Pic.4**). The position of the fingerboard is also drawn onto the wider face of the cedar (**Pic.5**). It is possible to make the head and neck from a board of approximately 25mm thickness and to create the heel part by building layers of cedar together and using a scarf joint for the headstock. However, to be able to make the whole assembly from one piece adds strength and is also a lot easier to achieve.

The rough shape of the neck and head are cut on the bandsaw (**Pic.6**) and the face of the headstock is trued using a No.5½ bench plane or similar (**Pic.7**). While planing the face it is important to ensure it does not go out of winding. The curves for the inside of the slipper and heel can be cleaned up with a sanding stick made from a piece of plastic downpipe covered with abrasive that is held in place by double-sided tape. Once cleaned up, the slots which will accept the upper bout ribs are marked onto the sides of the slipper heel as well as a small ledge, which will accommodate the top edge of the soundboard. The slots are 2mm wide and the ledge is 3mm deep (**Pic.8**). The rib slots can be sawn out now. They are wider than a standard saw kerf so to enable the ribs to fit, I used a hand saw with no set for the first cut and placed a cabinet scraper into the slot and widened it by sawing alongside the scraper to create the 2mm gap needed (**Pic.9**). After the slots are cut the inner part of the 'slipper' is made a little narrower to help reduce weight. It is cut from either side of the slipper and is at a slight angle (**Pic.10**).

STEP 10. Reducing the width of the 'slipper'



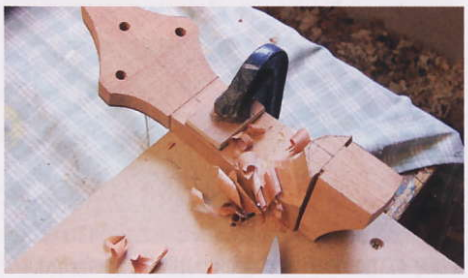
STEP 11. Sawing out the rough profile of the heel

The heel

As we cannot see the heel of the instrument in the stone carving I have made up a simple design which, once marked out, is trimmed with a 'Freeway' coping saw (**Pic.11**). Later a Japanese marking knife (**Pic.12**), which has an extraordinarily keen edge, is used to get near to the final shape (**Pic.13**). Getting inside the curves to remove stock is easily done using a curved razor file (**Pic.14**).

Facing the head & positioning the peg holes

In the original the head was almost certainly not faced with veneer, and the only reason I have chosen to do this is to improve the appearance. I used two small pieces of bookmatched rosewood to make the facing with a centre strip made from some scraps of guitar purflings I had made some 20 years ago. The centre strip is not really needed, but adds to the interest. The facing is held in a simple wedged jig (**Pic.15**) while the glue dries (**Pic.16**) and cleaned up afterwards with a paring chisel (**Pic.17**) and then sanded to a thickness of around 2mm. Before clamping the facing into place it is worth drilling four 1.5mm holes in each corner (**Pic.18**) so that hardboard pins (which happily have a diameter of 1.5mm) can be used to prevent the face from sliding out of line when the pressure is applied as the glue dries (**Pic.19**).

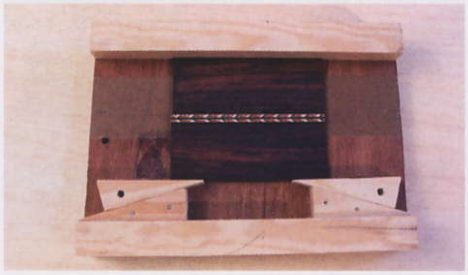


STEP 12. Using a Japanese marking knife to shape the heel

STEP 13. The knife needs extreme care as the edge is so keen

STEP 14. Final shaping of the heel is completed using a razor file

STEP 15. The headstock facing jig



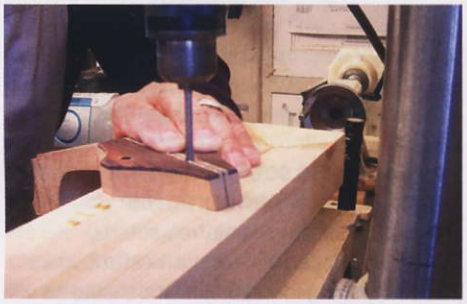
STEP 16. The headstock facing held firmly in the jig while the glue sets

STEP 17. Trimming the head facing centre strip using a paring chisel

STEP 18. Pin holes are placed on the facing to prevent movement

STEP 19. The facing in place

STEP 20. Shaping the headstock with a round sanding stick



STEP 21. Drilling out the peg holes

STEP 22. Reaming the peg holes

STEP 23. Chiselling the soundboard ledge

The next task is to shape the head and here some personal preference can be used. In the original carving the head has simple straight edges, but I felt it was worth improving the look by adding some curves, which are cleaned up using the downpipe sanding stick made earlier (**Pic.20**).

The three peg holes are then drilled out at a diameter of around 5mm (**Pic.21**). These holes are then reamed from the back of the headstock to allow the pegs to fit tightly (**Pic.22**). Finally, before the neck is ready for fitting, the 3mm ledge previously mentioned should be cut above the slipper to allow the front to lie flush with the face of the neck. A very sharp paring chisel will do the job well (**Pic.23**).

Turning the pegs on the lathe

The pegs must be made from a hardwood, such as rosewood or ebony, as they could otherwise wear very quickly. Here further personal preference can come into play, though I chose to use the standard violin peg shape by first turning the 1:40 taper on the shank and then a ball at the end with a small bead separating the two (**Pic.24**). When the peg is taken from the lathe, opposite sides of the ball are cut flat to make the peg easier to turn; this can be done with a fine saw or chisel (**Pic.25**). Note that the peg may be held in a hardwood block with a reamed hole while it is being shaped. A curve can be applied to each cheek to give the peg an authentic appearance, though this is not strictly necessary (**Pic.26**). The overall length of the peg is around 58mm.

While reaming the holes it is important to take just a little out at a time as it is easy to go too far and the peg will go right through to the bead and will not fit tightly. Softly-softly is the name of the game here. To fit well the peg should protrude by around 13mm from the facing. A small hole must be drilled in the end of the peg, about 6mm in, to allow the gut string to pass through while being wound on.

Preparing the rib- & end-blocks & fitting them to the board

I made these blocks from pine by first preparing a billet 320mm long and measuring 55 × 50mm (**Pic.27**). The sharp edges are taken off with the plane as the billet is prepared for the lathe. All three blocks can be turned at once, two having a diameter of 40mm and one a diameter of 24mm (**Pic.28**). All three blocks share the same height of 50mm and once finished, they must be sanded to a right angle on a board to ensure a flat fit (**Pic.29**). It is possible to fit the ribs into the blocks left as pine, but I felt it would improve the look if I veneered them. I chose walnut and used elastic

STEP 24. Turning the rosewood pegs on the lathe

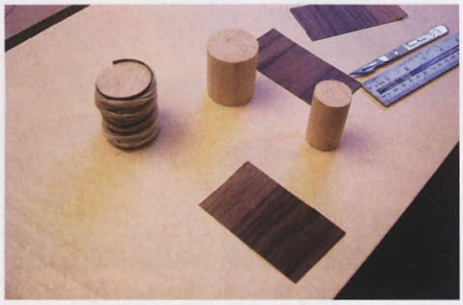
STEP 25. Chiselling the flats on the peg buttons

STEP 26. Applying a curve to the flats on the peg button

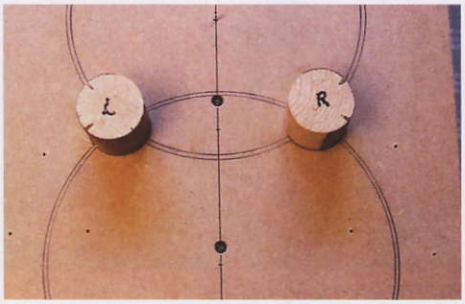
STEP 27. Preparing the pine billet for the rib- and end-blocks ready for turning

STEP 28. Turning the rib- and end-blocks on the lathe

STEP 29. Squaring the ends of the blocks on a flat sanding board



STEP 30. Veneers are held in place on the blocks using elastic bands



STEP 31. The rib blocks are held in place from underneath on the workboard

STEP 32. Cutting the first rib slots on the bandsaw

bands to hold the veneer in place as the glue dried (**Pic.30**).

The next step is to cut slots into the sides of the blocks to receive the ribs. The best way to judge exactly the angle of the slots is to screw the blocks to the workboard dry from underneath and then to mark both the position and angle of each slot (**Pic.31**). I made the first cut for each slot on the bandsaw (**Pic.32**), and used the same method as before to make the slots exactly 2mm wide to receive the ribs. Each finished slot should be around 4 or 5mm deep.

Cutting & bending the sides

The ribs are cut to an oversized length of around 300mm and the edges planed true to give a height of just over 50mm (**Pic.33**). The edges of each rib that will be placed against the underside of the soundboard should be planed very accurately as when the top is fitted any gaps will show up. The sides must then be reduced in thickness to 2mm and this is best done with the No.080 scraper plane. All four sides can be reduced at the same time (**Pic.34**). Once at the correct thickness, they can be bent into a semicircle on the hot iron (**Pic.35**).

Fitting the ribs into the neck & blocks

The lower bout ribs can be fitted into the blocks straight away (**Pic.36**), but before the upper bout ones go into place, shims must be placed underneath all four to emulate the position of the soundboard. The neck is screwed to the workboard from underneath (don't worry – the screw holes will later be covered by the fingerboard) and the upper bout ribs fitted. It is worth having a handful of cams that can be screwed to the workboard from above to hold the shape of the instrument as the glue dries (**Pic.37**). We are now beginning to see the three-dimensional instrument take shape (**Pic.38**).

Preparing the soundboard including sound holes & harmonic bar

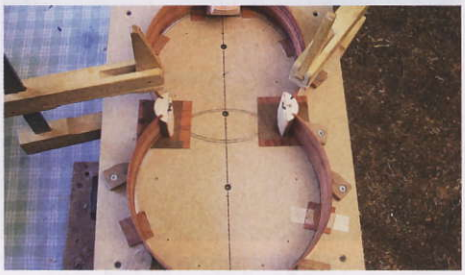
The soundboard is generally regarded by luthiers and players alike as the most important part of any stringed instrument and should be carefully prepared from good quality, close-grained spruce. It is constructed from two pieces of bookmatched timber joined along the centre. The edges to be joined are first planed true (**Pic.39**) and then squared with a sanding stick made from an old 600mm spirit level with the abrasive held along its edge with double-sided tape (**Pic.40**). This simple method ensures there will be no gaps in the join. It is then placed into a wedge and lace jig (**Pic.41**).

STEP 33. Four ribs are required

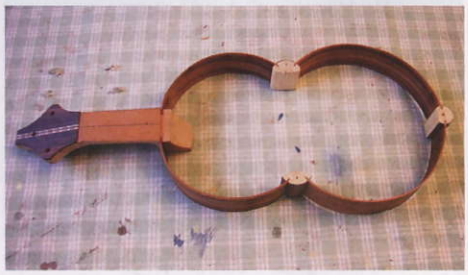
STEP 34. The ribs are reduced to 2mm thickness using a scraper plane

STEP 35. Bending the ribs on the hot iron

STEP 36. The lower bout ribs in place



STEP 37. Cams help to keep the shape



STEP 38. The fiddle has gone 3D

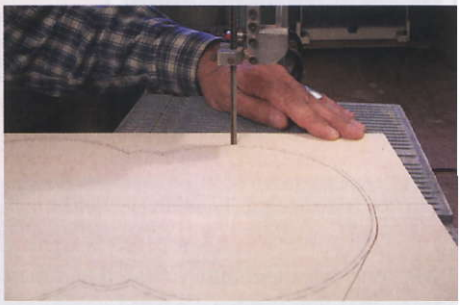
STEP 39. The soundboard edges that will meet are planed true

STEP 40. They are then sanded to 90°

STEP 41. The two halves of the soundboard in the wedge and lace jig

STEP 42. The wedge and lace jig is made from building timber and hardwood

STEP 43. Planing the soundboard to 3mm thickness



STEP 44. The soundboard is cut slightly oversize on the bandsaw

This jig is of an ancient design and is very easy to make. The centre billet is a piece of roofing truss and the bars are 'two by one' scantling. The bars are housed into the centre billet and sit flat. The wedges were made from an old coffee table top and are a hardwood. The laces are each 3m long and made from thick nylon cord. As the laces are pulled crisscross over the spruce and held tightly in a slot at one end of the bar, the wedge is pushed in holding the soundboard flat while pulling the joined edges firmly together – ingenious and effective (**Pic.42**).

The soundboard must next be brought to a thickness of around 3mm and this is best achieved using a very sharp bladed plane, usually a No.2 or a No.5½ (**Pic.43**). Once at the correct thickness the shape is cut out on the bandsaw around 5mm oversize all around (**Pic.44**). The sound holes can give a bit of room for personal preference and were of very varied designs on many mediaeval instruments. Once a decision has been made as to the shape of the holes they are carefully cut out with a fretsaw (**Pic.45**) and finished on all inside edges with 320 grit aluminium oxide paper attached to thin strips of wood with double-sided tape.

A very slight arch should be applied to the soundboard and to do this a 'harmonic bar' should be fitted on its underside. It is made from spruce, is 5mm wide and 14mm high (**Pic.46**). The grain should run vertically through the bar and the arch should give no more than a 2mm lift at the centre and is applied first with a shoulder plane (**Pic.47**) and finished with a sanding stick. When fitted in a position below where the bridge will sit (**Pic.48**) the ends are scalloped with a sharp chisel (**Pic.49**). The bar is then gabled to reduce weight and yet maintain strength (**Pic.50**). The soundboard is now ready to fit. **GW**

STEP 45. 47 sound holes are cut out with a fretsaw

STEP 46. The harmonic bar under preparation

STEP 47. The bar is slightly curved

STEP 48. The bar is clamped into position using Titebond glue

STEP 49. Scalloping the ends of the harmonic bar

STEP 50. Gabling the ends of the harmonic bar

SUPPLIERS OF TONEWOODS, TOOLS & ACCESSORIES

- **Stewart MacDonald** – for tools, timber, pegs, finishing supplies etc. USA based **www.stewmac.com**
- **ToneTech Luthier Supplies** – as with Stewart MacDonald but based in the UK **www.tonetechluthiersupplies.co.uk**
- **Touchstone Tonewoods** – same as Tonetech **www.touchstonetonewoods.co.uk**
- **Capital Crispin Veneers** – possibly the largest collection of veneers in Europe. Sells by mail-order **www.capitalcrispin.com**
- **David Dyke Luthiers Supplies** – excellent for high quality timber. UK based **www.daviddyke.co.uk**
- **www.hairworks.com** – for Mongolian horsehair in small hanks
- **www.earlymusicshop.com** – for gut strings, pegs and early instrument supplies
- **www.smallwonder-music.co.uk** – for decorative back strips and inlay materials

USEFUL READING

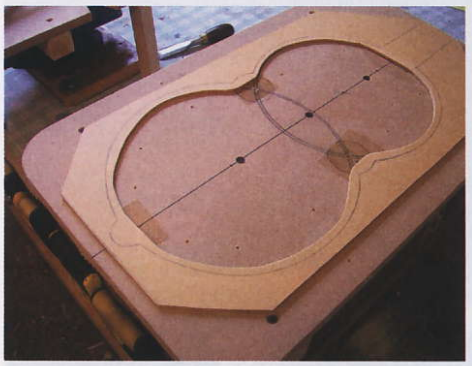
- *Making Early Stringed Instruments*, Ronald Zachary Taylor, Stobart Davies Ltd. ISBN: 0 -85442-051-7 – has a chapter specifically devoted to the mediaeval fiddle
- *The Guitar Maker's Workshop*, Rik Middleton, The Crowood Press. ISBN: 186126-0407 – has useful tips on making a bending iron
- *The Galpin Society Journal* – April 2016, The Dorset Press – has an article by Daniel Rose-Jones on the construction of an early fiddle. Also April 2000, an article by Mary Anne Alburger 'The Fidill in Fist' on the subject of bowed instruments from the *Mary Rose*

NEXT TIME

In part 2, in *GW316*, Shaun completes the build of his fiddle and also shows you how to make a customised case

Making mediaeval music PART 2

Shaun Newman completes his mediaeval fiddle build and also shows you how to make a customised case to protect your wonderful hand-crafted creation



STEP 51. A spacer made from hardboard protects the curvature of the soundboard

In part 1 of this series we looked briefly at the history of the mediaeval fiddle and how it may have been made. We saw the construction of a workboard and most of the component parts, including the head and neck, the ribs, the back and the soundboard.

In part 2 we will see how the instrument is finally put together, how it is strung, how a bow is made, and how a custom case is built.

Fitting the soundboard with 'tentellones'

While fitting the soundboard there is a danger that the curve made by the harmonic bar will be damaged. To avoid this a shallow well made from hardboard is put into place that supports the edges of the soundboard while leaving sufficient room for the curve to be protected and not crushed (**Pic.51**).

Before the soundboard can be fitted, both ends of the harmonic bar must be cut to length so that it sits inside the ribs. The exact place where the bar ends must be cut is marked in pencil (**Pic.52**), cut with a veneer saw and trimmed off using a paring chisel (**Pic.53**). The next step is to mark the position of the blocks, which by now have been reduced on the inside to cut down weight. Once established, those points of contact can be painted with Titebond and the ribs brought down into place and cramped (**Pic.54**).

'Tentellones' are often used in the making of stringed instruments, particularly classical guitars. They are tiny triangular shaped pieces of spruce around 7mm high and 5mm square at the widest point. Around 100 are needed to fit the soundboard with just two extra-long ones made to help prevent the harmonic bar from springing off when the pressure from the strings over the bridge is applied (**Pic.55**).

The tentellones are put into place using tweezers (**Pic.56**). The underside and back edge of each one is coated in glue and once pressed into place, no clamping is required. After around 20 or so have been inserted, I usually push them home with the end of a pencil that has a rubber attached, just to make sure they are sitting tightly.

The soundboard is now ready to have the edges trimmed, which can be done using a small hand-held router with a bearing-guided flush cutter fitted. The edges are then finished with a sanding stick and rounded over.

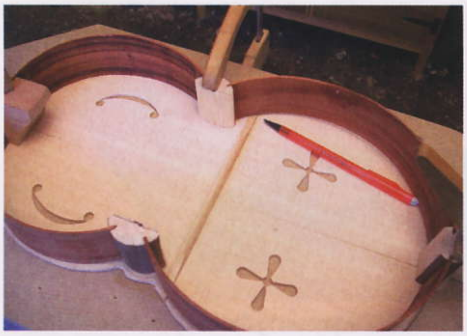
Preparing the back with centre strip, cross-banding & label

The back is made from two pieces of book-matched padauk joined at the centre with a decorative strip inserted to add to the

appearance. The boards are planed true (**Pic.57**) and the edges are squared in the same way as those of the front. The two parts of the back and the decoration are then held firmly in the wedge and lace jig (**Pic.58**).

Once the glue has dried the back can be removed from the jig and thicknessed to around 2mm. Once again, the Record No.080 scraper plane does an excellent job (**Pic.59**).

Before the back can be fitted it needs to be strengthened on the inside along the glue lines. Here it is necessary to fit some cross-banding so that the grain runs across the join rather than along it. The banding is made from spruce taken from waste left over from making the top. It is around 15mm wide and 2mm thick. The strip can be held in place with heavy weights while the Titebond cures (**Pic.60**). Glue squeeze out is removed with the paring chisel (**Pic.61**), the outline of the back is transferred from the cardboard template onto the timber, which is then cut slightly oversize on the bandsaw. Finally the label is fitted (**Pic.62**) and the back is now ready for the next step.



STEP 52. Marking the position of the ends of the harmonic bar

STEP 53. The harmonic bar is trimmed to length with a paring chisel

STEP 54. The rib blocks being glued into place

STEP 55. 'Tentellones'

Fitting the back with kerfed linings

Before the back can go on, it is necessary to make sure the ribs are level with the tops of the blocks and the underside of the heel. I usually use a thumb plane to do most of the work (**Pic.63**), and finish with a flat sanding stick. If the sides have been made to almost the exact height, then all that will be needed will be the stick.

Once level, kerfed linings should be put into place. They are a continuous strip of wood (I made mine from light mahogany) with the same profile as a tentellone. The saw kerfs are around 5-6mm apart and go almost right through, but not quite (**Pic.64**). This way the strip can be bent around the curve and held in place with a number of mini clamps or clothes pegs (**Pic.65**). When the glue has dried the tops of the linings may protrude a little so it will be necessary to level them to the exact height of the ribs.

I like to use cam clamps when fitting instrument backs (**Pic.66**) but they are expensive and not absolutely necessary. As this instrument has a flat back and the front curve is not in danger, weights may be used, or even elastic bands that wrap around the entire workboard and pin the back in place.

As the back is made slightly oversize, the edges should be trimmed off in similar fashion to the front, which is with a router and flush cutter. The edges are then rounded off with a sanding stick.

Preparing & fitting the fingerboard & top nut

We have no way of knowing what the fingerboard was made from in the original instrument, but as it is the part of the instrument most likely to wear apart from the pegs, a hard wood is preferred and I used a small billet of rosewood measuring 150 × 45 × 10mm. The fingerboard is tapered slightly from the nut towards the body of the instrument. At the nut the width is 42mm and at the point where it lies over the shoulders of the upper bout it measures 46mm. It is also tapered in its depth from around 5mm at the nut to 9mm at the end (**Pic.67**). To help playability it is also curved slightly (**Pic.68**). The profile of that curve will later be reflected in the bridge. The end of the fingerboard sits just above the soundboard without being attached so a ledge is chiselled out on the underside to allow this (**Pic.69**).

To prevent the fingerboard from sliding out of line when the clamps are put on it is a good idea >

STEP 56. Putting the tentellones into place using tweezers

STEP 57. Truing the centre edges of the back

STEP 58. The back and decorative centre strip in the wedge and lace jig

STEP 59. Thicknessing the back to 2mm with a scraper plane

STEP 60. The back centre strengthening strip under weights

STEP 61. Removing glue squeeze-out with the aid of a paring chisel

STEP 62. The label in place

to drill a couple of 1.5mm holes so that hardboard pins can be used to hold it in place as the glue dries under pressure (**Pic.70**). When the glue has dried, the pins are removed and the tiny holes are filled with CA adhesive and rosewood dust making it virtually impossible to see where they had been. Once sanded clean the fingerboard is ready, as, in keeping with the modern violin, no frets are fitted. It is important to remember to fit the fingerboard with a sufficiently wide gap between it and the headstock veneer to allow the nut to sit tightly in place (**Pic.71**).

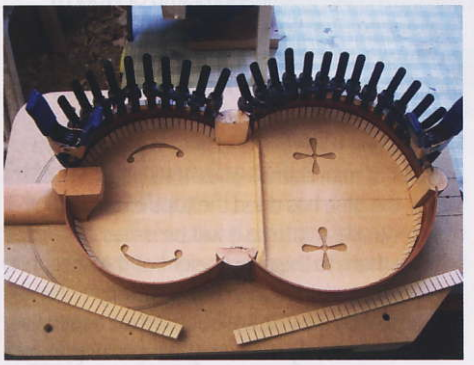
The nut is made from a small piece of bone or hardwood measuring 42mm by 9.5mm and 3mm-thick. It should be curved along the top edge to match the profile of the fingerboard. Three grooves are then filed into the top edge to receive the strings. The grooves should have a half-round bottom, and be cut to a depth equivalent to half the string thickness. One groove is in the centre and the other two are 5mm from either end of the nut (**Pic.72**).

Making the bridge & tailpiece

These two small items are really important as without them the instrument would be unplayable. They are both made from rosewood, the tailpiece measuring 80 × 40 × 3mm-thick while the bridge is cut from a small billet 60mm long × 17mm high × 10mm-thick.

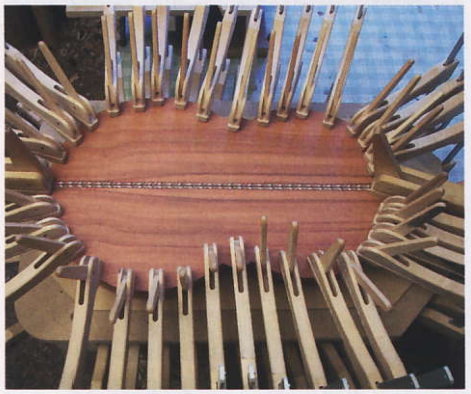
The tailpiece can be fretted to a number of designs but must not be made too weak to endure the pull from the strings. I attached white self-adhesive labels to the rosewood, drew the design out (**Pic.73**) and fretted through the label and rosewood (**Pic.74**). The fine detail is finished with needle files. I glued a small strip of 1mm-thick model maker's ply under the two ends where the string holes are to offer a little more strength. The bridge is made in a similar way, giving two feet 10mm square to sit on the soundboard (**Pic.75**). To ensure a close fit to the slight curve in the soundboard the feet are dressed by abrasives temporarily taped to the front (**Pic.76**). The top edge of the bridge is gabled and curved and, once again, grooves are needed to ensure the strings do not slip off.

STEP 63. A thumb plane helps to level the ribs



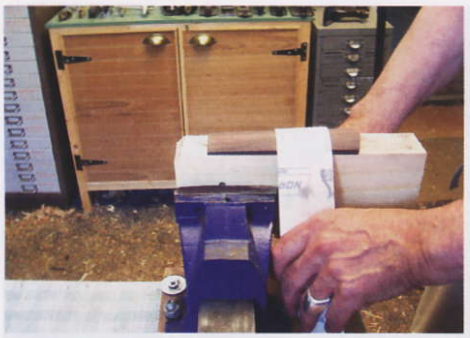
STEP 64. Half of the kerfed linings held in place

STEP 65. The completed linings in place ready to support the back



STEP 66. The back clamped into place

STEP 67. Preparing the rosewood fingerboard



STEP 68. Curving the fingerboard

STEP 69. The ledge that allows the fingerboard to overhang the soundboard

One groove is cut in the centre and the other two 6mm from either end. Remember that the depth of the grooves will be half the thickness of the string.

Final shaping of the neck & fitting the heel cap

Overall the final shaping is done with 120, 240, 320 and 400 aluminium oxide abrasives. The depth of the neck and fingerboard combined should be at around 22mm at the central point. This is fairly near to the neck thickness of a modern violin. As the back of the instrument is trimmed level with the shoulders, a small cap can be fitted. This is made from a piece of rosewood 2mm-thick to match the thickness of the back. It is held in place with cam clamps and can very easily slide out of line when your back is turned, so beware (**Pic.77**).

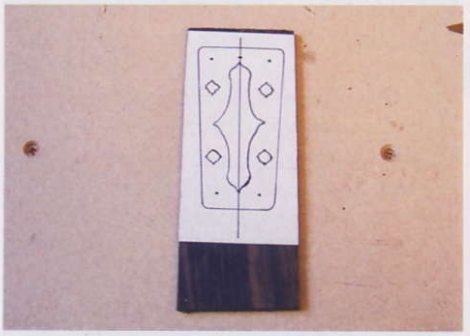
STEP 70. Pins are used to prevent the fingerboard from moving while the glue dries

Applying the finish

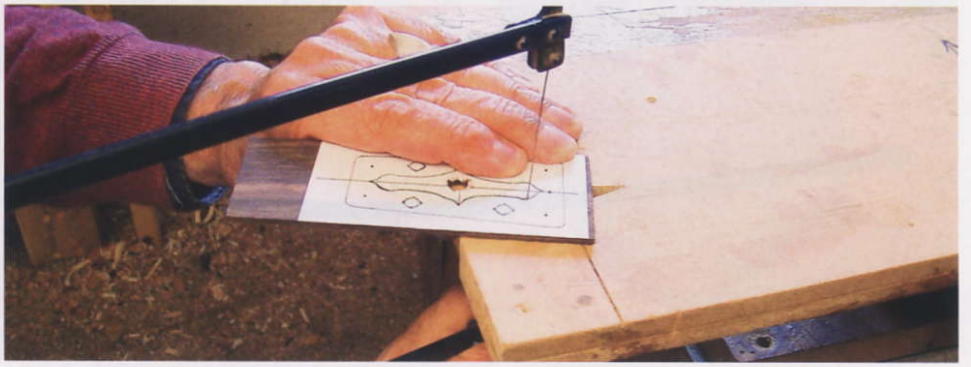
There are many types of finish that can be used on an instrument like this from acrylic resins, oils, polyurethanes, nitrocellulose lacquer and so on. At the time these fiddles were made, a favourite seems to have been egg tempera or similar as a base followed by some sort of vegetable oil or varnish. I chose Liberon finishing oil as it is very easy to apply and once oxidised can be cut back with 400 grit abrasive and refinished to give a soft satin sheen. I usually go through the whole process around five times to allow a sufficiently robust thickness of finish to develop, thus offering good protection. A further advantage of Liberon oil is that if the instrument gets scratched then that area can be cut back and oil applied, leaving little or no trace of the original damage. The final task in applying the finish is to buff with a cotton cloth, before standing back and admiring your work! >

STEP 71. The fingerboard in place

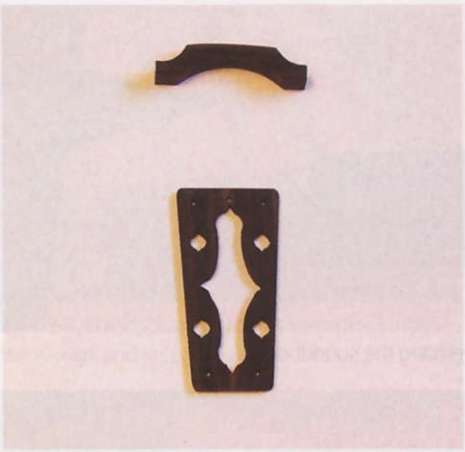
STEP 72. Preparing the bone



STEP 73. The tailpiece design marked onto self-adhesive labels



STEP 74. Fretting out the tailpiece design



STEP 75. The rosewood tailpiece and bridge

STEP 76. Ensuring a close fit for the bridge feet

Making the bow

Images of these early instruments show a bow, which is more akin to that of an archer than a modern violinist. This type of bow should be made from a springy wood such as ash around 500mm long, 10mm wide and 5mm-thick. Alternatively, it is possible to hunt for an old violin or cello bow (or even a child's play bow) and use the wood from that. I was lucky to find a cello bow in a charity shop for £2, which had a pernambuco shaft – this being the preferred choice of bow makers.

The technique involves cutting a notch at either end of the shaft, selecting no more than 25 or so hairs from the hank (**Pic.78**) and tying a knot in one end. The hair is then soaked in warm water for a few minutes and then pulled tight and kept flat. A further knot is tied at the other end of the horsehair and both knots are pushed just behind the two notches with the shaft slightly bent. The bend should be gradually increased by re-tying one of the knots and increasing the tension over a few days. When it feels ready to fire a small arrow it is probably about right (**Pic.79**).

Fitting the pegs, stringing up & tuning

Some of the oil may have entered the peg holes so it is as well to clean the insides with the reamer. Once the pegs are firmly in place attention is given to fitting the tail piece. A 2mm hole must be drilled through the end block just shy of the bottom of the lower bout and parallel with the plane of the soundboard (**Pic.80**). The tailpiece is then tied to the bottom block with gut or nylon. The three playing strings must be made of gut to ensure an authentic sound (see list of suppliers at the end of the article). The ends of each of the three strings are attached using a knot that will not slip, i.e. a 'stop' knot. The strings are then threaded through the holes in the pegs with the string ends trapped by the first twist. Rather than bring all of the strings up to pitch together it is best to ease them one after the other in rotation, gradually evening out the tension.

Deciding on exactly how to tune this fiddle is an interesting challenge. For starters, mediaeval tuning was generally at a different pitch to the modern convention of A440. Indeed until tuning was standardised as late as the middle of the 20th century, tuning varied from country to country making mixed concerts very difficult.

STEP 77. The rosewood heel cap in place

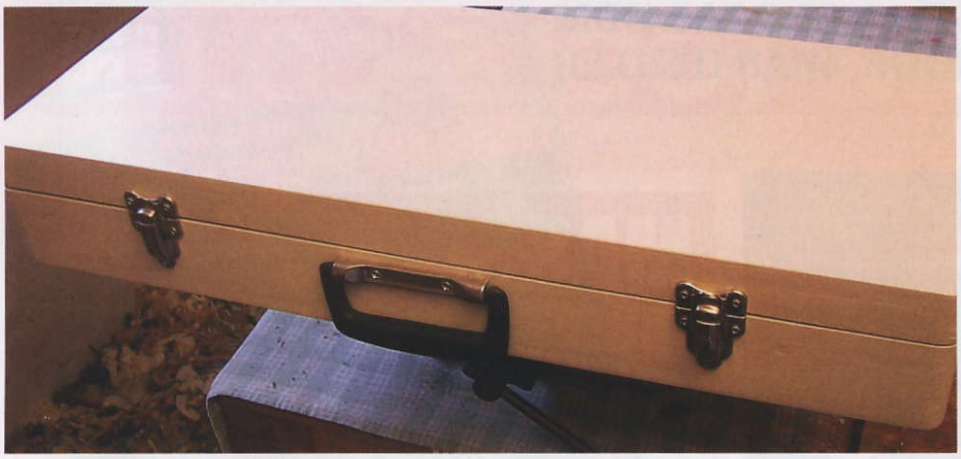
STEP 78. Mongolian horsehair bought in 'hanks'

STEP 80. Drilling the tailblock to enable the tailpiece to be secured

STEP 79. The bow ready to use

USEFUL READING

- *Making Early Stringed Instruments*, Ronald Zachary Taylor, Stobart Davies Ltd. ISBN: 0 -85442-051-7 – has a chapter specifically devoted to the mediaeval fiddle
- *The Guitar Maker's Workshop*, Rik Middleton, The Crowood Press. ISBN: 186126-0407 – has useful tips on making a bending iron
- *The Galpin Society Journal* – April 2016, The Dorset Press – has an article by Daniel Rose-Jones on the construction of an early fiddle. Also April 2000, an article by Mary Anne Alburger 'The Fidill in Fist' on the subject of bowed instruments from the *Mary Rose*



STEP 81. The exterior of the wooden case

The second issue to consider is of the three strings: which was used for what purpose. Very probably there were two drone strings and one melody, all made from gut. The range would have been no more than one octave, and the pitch would favour the singing voice.

With all of this in mind I chose to tune the first string, which is the melody string, to A above middle C and the second and third to G below middle C and D above middle C. This method is known as 're-entry' tuning. It takes a few days before the fiddle is ready to play properly as the strings take time to stretch. Before playing the fiddle the bow hair should be treated with rosin to ensure a good sound.

Making a customised case

Unless you go to a custom case maker such as Kingham MTM where naturally prices are high, it is as well to make your own. Effectively the case is a box (**Pic.81**) with a neck rest (**Pic.82**). The sides and ends are made from 19mm pine boards and the top and bottom are of 4mm ply. The interior is lined with thin foam rubber and covered with crushed velvet. The interior padding is then held in place with double-sided carpet fitter's tape. The occasional discreet pin along the edges of the padding helps to keep it secure, but the tape holds quite well. The neck rest is 19mm pine and the crushed velvet is stretched over the rest at double thickness and held in place with gimp pins. The rest itself is held firmly on the inside of the case with 63mm panel pins, which pass through the sides into the neck rest. Before fitting the hinges, the handle and the clasp, I painted the whole exterior with Ronseal cupboard paint, which is very durable. You now have a robust case to keep your beautiful mediaeval fiddle safe from damage. **GW**

STEP 83. The completed fiddle from the front...

STEP 82. The interior showing the neck rest

SUPPLIERS OF TONEWOODS, TOOLS & ACCESSORIES

- **Stewart MacDonald** – for tools, timber, pegs, finishing supplies etc. USA based **www.stewmac.com**
- **ToneTech Luthier Supplies** – as with Stewart MacDonald but based in the UK **www.tonetechluthiersupplies.co.uk**
- **Touchstone Tonewoods** – same as Tonetech **www.touchstonetonewoods.co.uk**
- **Capital Crispin Veneers** – possibly the largest collection of veneers in Europe. Sells by mail-order **www.capitalcrispin.com**
- **David Dyke Luthiers Supplies** – excellent for high quality timber. UK based **www.daviddyke.co.uk**
- **www.hairworks.com** – for Mongolian horsehair in small hanks
- **www.earlymusicshop.com** – for gut strings, pegs and early instrument supplies
- **www.smallwonder-music.co.uk** – for decorative back strips and inlay materials

STEP 84. ... and back