

BAROQUE BEAUTY PART 3

In the final instalment of this unique build, **Shaun Newman** constructs the back of the instrument, bridge and 'mustachios', fits the frets, strings up and tunes, before making a custom carrying case

In part 2 of this series, I looked at the construction of the soundboard and described how it is fitted. This was followed by the complex methodology needed to create the outer rosette and the 'parchment rose'. In this final part, I will show you how to construct the back of the instrument, bridge and 'mustachios', fit the frets, stringing up and tuning, before making a custom carrying case.

The back

It's now time to consider the best way to construct the back. In some early guitars, particularly during the Renaissance period, and then later in the Romantic era, the back

of a guitar would be made from a single piece of timber, possibly with little or no decoration. Some were even made from inexpensive spruce and veneered with a more expensive and exotic timber. The Baroque era, however, enjoyed some very complex and decorative designs on the back of the instrument as well as the front. A glance at some of the instruments made by the Voboam family, and many Italian makers, show extraordinary designs featuring stripes, chevrons and many forms of parquetry. I chose to stay with the idea of a couple of contrasting timbers, so made up a series of pieces of spruce and mahogany. The mahogany strips were made to a slightly narrower width as those used for the ribs, i.e. 16mm. The maple pieces were wider and tapered to lend a more elegant appearance. All of the edges to be joined were trued to an exact right angle as with the soundboard, and able to make a perfect join along the entire length. Between the mahogany and maple are black tulipwood inserts, and at the centre is a herringbone back strip made from two pieces of purfling placed side by side to create the pattern. Getting the whole lot safely into the wedge and lace jig was a bit like

herding recalcitrant cats, but when everything had been pressed into place by the wedges the overall look of the back of the instrument appeared and looked pretty good. Once out of the jig, the back had to be brought to a thickness of just 2mm. This involved extremely careful handling not least because of the sheer number of butt joints.

Bracing the back & fitting it

Given the delicate nature of the back I decided to put four bracing struts in rather than the customary three (**photo 62**). Each strut is made from spruce, and as is the case for the soundboard braces, they are 6mm wide and 15mm high. To create the characteristic look of the back of the instrument they were previously arched. I usually aim to gain a 4mm 'lift' at the centre of the back, so the struts are shaped on a sanding stick to conform to that curve (**photo 63**). They are then treated in the same manner as the front braces, i.e. scalloped at the ends and gabled (**photos 64 & 65**). Once again, the ends of the braces overhang the edges of the back by a couple of millimetres. At this point, I decided to put my brand label in, though



62 The four back braces are cramped into place



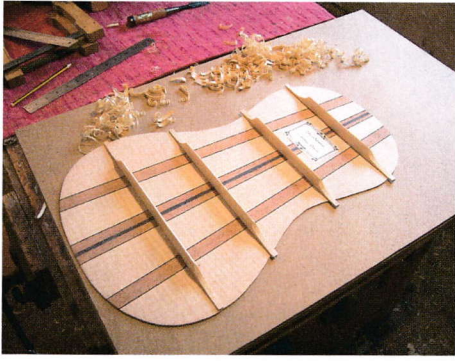
63 The back braces are curved on a sanding stick



64 The ends of the back braces are scalloped



65 The back braces are gabled



66 The maker's label in place



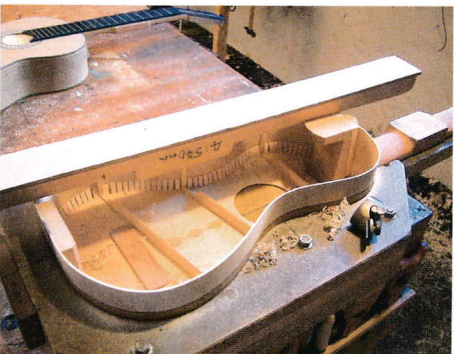
67 The kerfed lining is held in place with mini clamps

of course it will never be visible due to the presence of the parchment rose (**photo 66**).

It would be difficult to use tentellones to help attach the back to the ribs, so a continuous strip of kerfed lining is used. This lining has a triangular end profile and is normally made from mahogany or perhaps lime and is 15mm high, and 7mm wide. Such strips are commercially available, but can easily be made with the use of a bandsaw and the right angle slot of a mitre block. Each kerfed cut goes almost through the strip, but not quite, by just 1mm.



68 A thumb plane can be used to level the lining

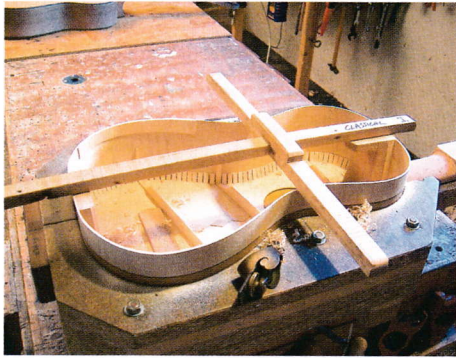


69 Curved sanding stick used to produce the 4mm lift

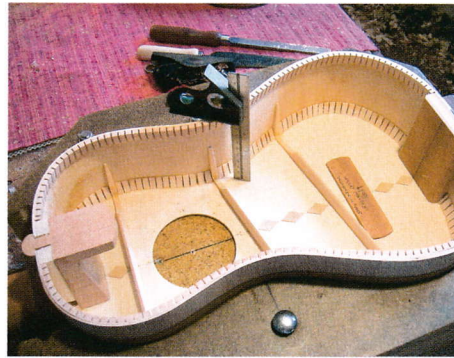


PROJECT

A classical guitar in the Baroque style – part 3



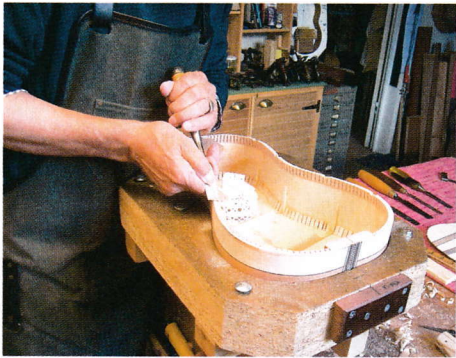
70 The jig that measures the curvature



71 A depth gauge keeps you on track



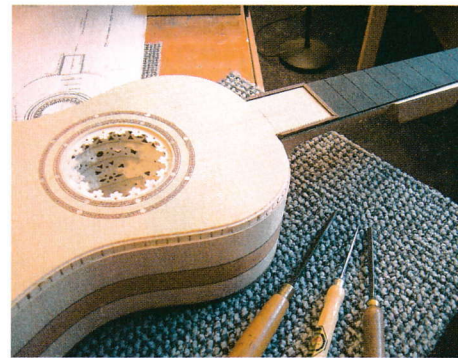
72 The razor saw is good for fine cuts



73 The notches are carefully chiselled out



74 Rebates for the bindings and purflings applied to the back



75 Rebates for the bindings and purflings applied to the front

The spacings are usually 6mm apart. When glued into place with small clamps (photo 67), the edges of the ribs, including the linings, are trimmed flush with a thumb plane (photo 68) and curved with the same sanding stick that was used on the braces. This sanding stick is long enough to cover the length of the back as well as its width enabling both the heel assembly and tail block to share the same profile (photo 69). Once the curvature seems to have been achieved, everything can be tested with a simple jig. This is made from two pieces of maple, with a cross halving at the centre of each piece. As the crossbar is run backwards and forwards along the centre rail, high and low spots can be seen and adjustments can be made with the sanding stick to ensure precision. Both crossbar and centre rail are curved to produce the 4mm 'lift' required (photo 70). To ensure opposite sides are the same height, a combination square is used as a depth measurer (photo 71).

To ensure the correct position of the back it is placed over the ribs, heel and tail block, lined up centrally, and the location of the edges of the struts are marked onto the ribs. A pencil

mark shows up well on the pale spruce. As each strut has been scalloped down to 3mm, a notch 3mm deep and 6mm wide is cut into the top of the ribs with a razor saw (photo 72) and chiselled out (photo 73). These notches are where the ends of the bars will neatly sit. A dry fit is recommended before proceeding with adhesive and if all is clear, the back can be attached and held in place with small cam clamps. These are expensive, and not truly necessary. Long elastic bands located on pins tapped into the sides of the mould can be used or even long strips of linen tape. Indeed some traditional makers insist on linen tape as there is no risk of damage to the wood.

When the back is at last in place and the overlap is trimmed off with a bearing-guided router bit, we have a 3D instrument that actually looks like a guitar!

Bindings & purflings

Many early instruments did not have bindings fitted, let alone purflings. In the Baroque era, however, some makers really went to town on this part of their build with striking designs that

often took up a good deal of the soundboard and back respectively. Coupled with complex headstock and rose designs, and bridge, the purflings often added a very exotic touch.

The bindings are present to protect the edges of the instrument, which is particularly important for the soft spruce of the soundboard. The purflings are for decoration, but can also act as a barrier preventing colour from bleeding from one type of timber into the one next door. Rosewood is often a culprit.

Before fitting either, a rebate must be cut around the edges of the instrument back and front. This can be done with a small hand tool known simply as a purfling cutter. These are not expensive to buy, but quite tricky to use. It is easy to damage the instrument during this operation, so a small hand-held router with bearing-guided rebate cutter is safer. Bindings are normally around 2mm thick and between 6 and 8mm deep. The cutter must be set in such a way that the rebate is even in depth and width all around the instrument. For this purpose, cutters are available with a range of bearings that will allow rebates



76 Bending the bindings on the hot iron



77 Masking tape holds the bindings in as the adhesive cures



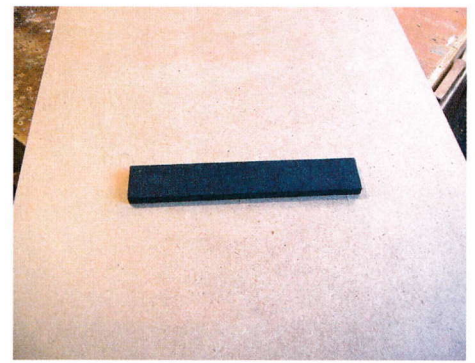
78 Masking tape also holds the front bindings in



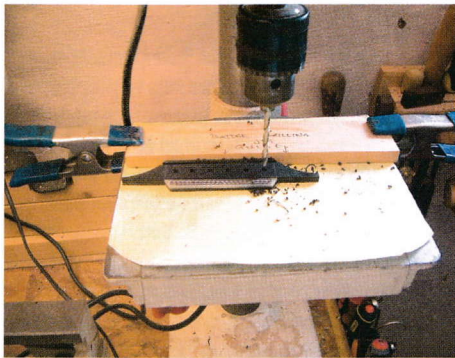
79 Cleaning up the bindings and purflings



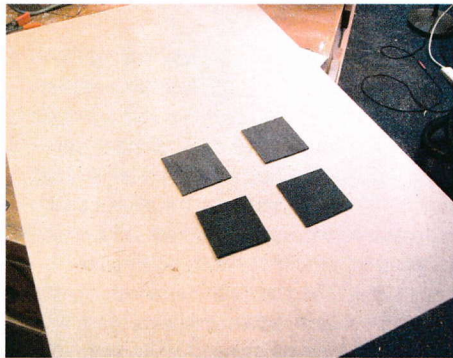
80 A small thumb plane does a neat job



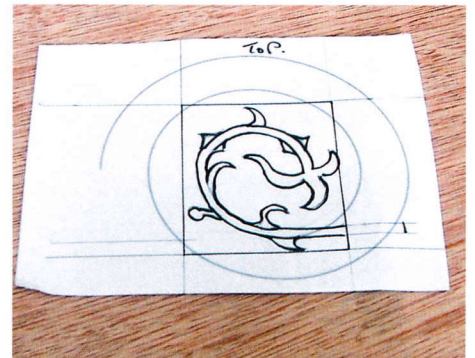
81 A simple billet of ebony will become the bridge



82 The bridge pin holes drilled



83 Laminated squares of ebony for the mustachios



84 The pattern for the mustachios scribed onto white paper

of different widths to be cut (see supplier list). When the rebates are ready for the bindings, a shallower and narrower cut is made for the purflings. There is no standard width nor height for the purflings, so the correct bearing must be selected (photos 74 & 75).

The next stage is to bend both purflings and bindings on the hot iron. This can be a tricky operation as the bindings in particular break easily. A thin flexible stainless steel ruler (which is normally around 0.15mm thick) with the binding placed between it and the hot iron helps to avoid any such accidents (photo 76). If care is taken to bend everything accurately, fitting will be made very much easier. On the back of the instrument the bindings and purflings simply meet at the centre line. This requires accuracy, as if they are cut too short it can be difficult to disguise the gap, and if they are too long they may bulge at some point leaving a part which is not properly held in place. For the front, the bindings and purflings meet at the tail end, but are mitred at the heel end as they must continue around that part of the soundboard, which meets the fingerboard.



85 The shape of the mustachios is carefully fretted out

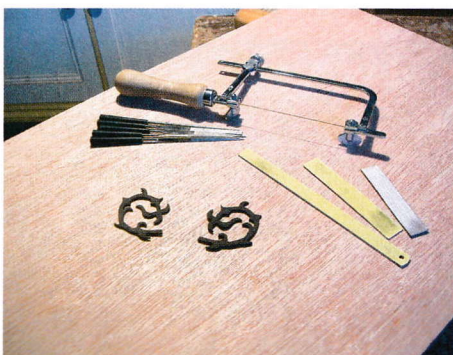
Once all looks good and ready to fit, strong masking tape is used to hold everything in place as the glue cures (photos 77 & 78). I normally leave the job overnight before taking the tapes off. During this process care must be taken while removing any tape from the spruce as the grain has a tendency to lift, particularly if a high tack one is used. When the masking tape has been removed it is time to level the bindings and purflings and to clean up. Both a thumb plane and razor file can be used for this operation, or in their absence, a sanding stick (photos 79 & 80).

The bridge & 'mustachios'

The bridge and characteristic 'mustachios' are often very ornate indeed on Baroque guitars, and on instruments made right through until the 1850s or so. They are made in three parts, the central section which holds the string ends and the two wings, so-called mustachios, at either end. The whole thing is made from ebony, the wings from laminated pieces, and the tie block and bridge itself from a single billet (photo 81). On most Baroque guitars the strings are tied

over the bridge through tunnels cut from back to front. For this instrument I decided to use bridge pins as I only wanted to fit six strings, and if I chose ebony pins with mother-of-pearl dots they would be in harmony with the sound hole rosette. I chose special pins known as 'presentation bridge pins', which have larger than average pearl dots (see supplier list). For decorative purposes I placed a bone cover along the lower edge of the bridge, inlaid with a double herringbone purfling once again to be in harmony with both the headstock design, and that of the tail block insert. I then drilled the six holes needed to accept the bridge pins. The spacings are carefully laid out with the two outside holes (i.e. for the treble and bass 'E' strings) exactly 60mm apart. The remaining holes are equally spaced between these two. A slot was then cut along the bridge 4mm from the edge that would face the headstock ready to receive a 2.5mm thick bone saddle (photo 82).

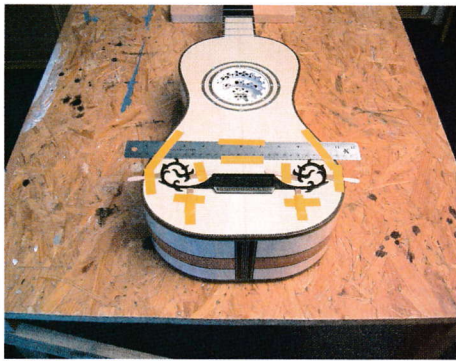
The mustachios are made from four pieces of ebony each 1mm thick and measuring 60 x 60mm (photo 83). Two are laminated with epoxy with the grain running at right angles between each piece.



86 The matching mustachio bridge wings



87 The bridge mask



88 The mustachios carefully held in place

The other two are similarly treated and when the epoxy has cured all four are stuck together with a piece of newspaper between them and fish glue. The grain on the top piece of the four must run in the same direction as the bottom piece. When the fish glue has dried a piece of white paper can be attached to the face of the stack, and with the grain running horizontally, the design is drawn onto the paper. A white, self-adhesive address label will serve well for this purpose (photo 84). The design is then carefully cut out with a fine blade fitted to a small fretsaw (photo 85). Once the design has been cut out and satisfactorily cleaned up with needle files, the assembly is dropped into hot water, which, after a while, will dissolve the fish glue and the two halves can be separated. The good thing about this method is that any slight error will look intended when the two halves are laid out like butterfly wings, so there is no need to worry about the blade going slightly off track (photo 86).

Before the mustachios can be attached to the soundboard the central part of the bridge must be put into place. The edge of the slot which will receive the bone saddle should be exactly 628mm from where the inside edge of the nut will sit. The outermost bridge pin centre lines should allow the two 'E' strings to lie 3mm on the treble side and 2.5mm on the bass side from the edges of the fingerboard. The area onto which it will be glued is masked off with tape (photo 87), finish is applied to the soundboard (see below further details on the type of finish used) and the bridge is attached after the mask has been removed. Normally the bridge on a classical guitar is attached with long reach clamps through the sound hole, but in this case, because of the parchment rose, weights are used. The mustachios are next coated on the back



91 Fretting... keep calm and carry on



89 Drilling down through the bridge is a life shortening moment...

with a very sparing layer of epoxy and held in place on the soundboard, also with weights. Applying as little adhesive as possible will make the clean-up much easier. It is important that neither mustachio moves while it is being glued, so a straightedge attached to the soundboard with masking tape and some small wooden strips (cut from coffee stirrers) strategically placed help to locate the exact line up of the two parts and does not allow either of them to move. Small pieces of masking tape can be made into handles, a little like stamp hinges, to pick up the mustachios as the adhesive is applied and to manoeuvre them into position (photo 88).

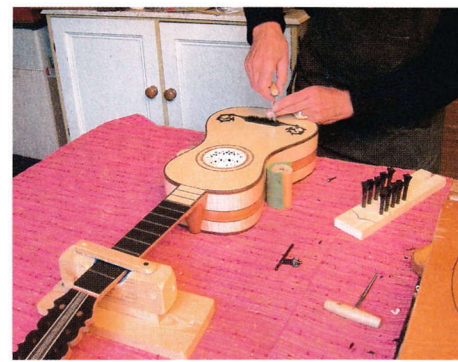
Finally, the holes that had been drilled down through the bridge to accept the pins should be further drilled to allow the bridge pins to pass right through the soundboard, and the mahogany strengthening plate directly beneath the bridge itself (photo 89). These holes are reamed to the same profile as the pins, which is usually 3° or 5° (photo 90). The pins are ready slotted to allow the string, which will have a stop knot tied in the end, to pass through the soundboard and then be trapped in position. Great care must be taken during this operation as it is very easy to ream too much material from the holes and the pins will jump out as the string is brought up to tension.

Fitting the frets

Originally the Baroque guitar would have had gut frets tied over the fingerboard around the neck. This method allowed the frets to be moved up or down slightly to adjust the tuning, which at the time had not been standardised. However, there is no need nowadays to have moveable frets, other than for the purist who might like to stay with tradition. As I wanted to play this guitar using modern tuning at standard pitch,



92 Final shaping of the neck with a chisel...



90 The bridge pin holes are reamed

I chose to go with fixed nickel silver frets. I fitted just 12, which give the opportunity to play three full octaves. Some Baroque guitars have up to 15 or 16 frets, and they are often attached directly onto the soundboard from 12 on. Given that two or three more frets would not extend the playing range very far, I decided to stay with simplicity and stop at 12, which usually lines up with the shoulders of the instrument.

The fret slots had already been cut into the ebony part of the fingerboard to the depth of the tang with a fine dovetail saw before the fingerboard was fitted. The last three slots, which pass across the tongue of spruce at the top of the soundboard, must be cut after the fingerboard has been attached. The frets are tapped in gently with a soft-faced hammer and trimmed flush (photo 91). Each fret end is trimmed off at an angle of 30°, smoothed with a fine file and wet and dry abrasive to take any rough edges away.

Once each stage has been achieved the final shaping of the neck can be undertaken. I usually begin with my old Marples 1in bevel-edged chisel and continue with a rasp. Eventually fine abrasive must be used to get the final, smooth finish for ease of playing (photos 92 & 93).

Next, consideration can be given to the finish. Originally a Baroque guitar would have been sealed with egg tempera, and finished with oil or similar. I chose to use a product from General Finishes in the USA. It is a satin acrylic resin, which is straightforward to use, water-based and environmentally friendly. It is available in the UK (see supplier list). As the resin had already been applied to the soundboard the task was somewhat reduced.

The bone nut & saddle

The top nut and bridge saddle on modern guitars



93 ... and rasp

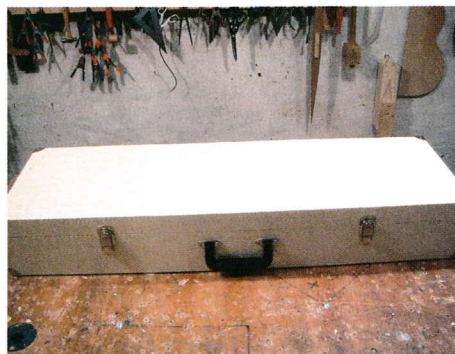


94 The saddle, before and after



95 The nut, before and after

are usually made from bone, but on many Baroque instruments ebony was used. Bone is always my preferred option as it is more durable. The saddle is made to fit the slot previously cut and sits around 4mm above the top surface of the bridge on the bass side, and 3mm on the treble. The strip of bone should sit comfortably in the slot and should not have any backward or forward movement. It is normally just over 2mm wide. The height measurements are a rough guide to begin with, and when the strings go on they may be adjusted according to the type of action required. Some guitarists who enjoy playing fast runs and scales will often look for a low action; others look to a high action to be able to get more tone colour from each note. This is very much a matter of personal taste. The edge of the saddle nearest the tail block is sloped downwards to allow the string to sit securely on its way to the bridge pin. Many makers will put an opposite camber where the 'G' string sits, to help improve intonation by lengthening it by a fraction (photo 94). At the other end of the fingerboard the nut is also made from bone but is thicker at around 5mm. The height of the nut should allow the strings to sit just under 1mm above the height of fret one and requires six grooves so they can be held in place as they are plucked. The grooves that hold the strings in place in the nut may be lowered if the player wants a low action at fret 1. As mentioned earlier the top 'E' string (also called No.1) is usually no more than 3mm from the edge of the fingerboard on Baroque guitars, whereas today on a full-sized classical guitar, it can be as much as 6mm. The bass 'E' (No.6) string sits at around 2.5mm from the edge while the remaining grooves are equally spaced between these two. As with the saddle, the back of the nut should be sloped down towards the headstock (photo 95).



98 The exterior of the case



96 D'Addario EJ45 low tension strings

Stringing up & tuning

There are very many makes of classical guitar string to choose from. The Early Music Shop in Saltaire, for example, can supply gut and so called 'Nylgut' strings for those wishing to reproduce a relatively authentic sound. For this guitar I chose D'Addario EJ45 low tension ones (photo 96). I have used D'Addario strings for over 50 years and they have always been very reliable (see supplier list). The instrument is then tuned in the standard way – 'EADgbe', where middle 'C' is the 'b' string held at the first fret.

The carrying case

The final task is to make a case – although cases for smaller guitars are available from good music shops they can be expensive and almost never fit perfectly. This case is really just a box lined with foam rubber covered in crushed velvet. A neck support should be put in place and a method of keeping the instrument firmly located is necessary. Hook-and-loop strips hold the neck nicely (photo 97). It is a good idea to fit 90° hinges to the lid as guitars are often damaged by lids falling on them while they are taken out or put into the case.

To protect the outside of the case I painted it with Ronseal cupboard paint, which is very hard and durable. The corner caps are optional but add a professional looking touch. A strong handle is needed as once in the case things are quite heavy (photo 98). The guitar is deliberately a tight fit in the case to prevent it from bumping around while it is being carried (photo 99).

The beautiful instrument that you will have made during the course of this series will certainly become a family heirloom.

In closing I would like to express my gratitude to Chris Large of Nantwich, a superb luthier who



99 The guitar is intentionally a tight fit



97 The interior of the case

gave me help and inspiration in my first attempts to build guitars in the Baroque style, in particular with an understanding of the intricacies of the parchment rose. Thank you, Chris. ✂

SUPPLIERS

These suppliers stock everything from Baroque guitar tuning pegs, through to strings, finishes, tools, timbers, bindings, purflings, calfskin vellum, drawings/plans and books and videos on guitar making and in the one case (Elena Dal Cortivo.... and just look at her work!) complete parchment roses made in traditional patterns

- www.stewmac.com – for all materials, tools, plans, drawings and accessories, and in particular bearing-guided router cutters for purflings and bindings
- www.tonetechluthierssupplies.co.uk – for timbers, tools and rosettes (not parchment roses)
- www.luthierssupplies.co.uk – for timbers, tools and plans
- www.madinter.com – for tools, exotic timbers, Baroque guitar pegs and many accessories
- www.tonewoods4luthiers.co.uk – for beautiful, exotic timbers and inlay materials
- dictum.com – for fine quality luthier tools and some fine timbers (especially Alpine spruce)
- www.smallwonder-music.co.uk – for inlay materials, purflings and m.o.p materials
- www.eurofinishes.com – for General Finishes acrylic resin
- www.luthiersnook.com – good for Baroque guitar pegs
- www.williamcowley.co.uk – calfskin vellum for the parchment rose
- www.schreinerhistoricalguitars.com – information source for help building a Baroque guitar
- www.harmonialutherie.com
- www.cincinnatiearlymusic.com – as above
- www.parchmentroses.com – just look at her work on parchment roses and gasp!
- www.graphtech.com – for 'Presentation Style' bridge pins with m.o.p inlays
- www.earlymusicshop.com – gut and similar strings for early instruments
- www.stringsdirect.co.uk – for D'Addario strings in full or part sets