



BY SHAUN NEWMAN

Highly strung!

The Spanish classical guitar has a quality of sound capable of creating an infinite variety of moods, thus setting itself apart from all other traditional instruments. This may seem an extreme statement, but the sound of the Spanish guitar has worked its way into my soul over nearly fifty years, and I know it's true. That's why I make guitars of my own...



THE MATERIALS YOU'LL NEED

- Head and neck: Honduras mahogany or cedar
- Front: fine-grained quarter-sawn spruce (e.g. Engelmann) or Western Red cedar
- Back and sides: rosewood or maple (cypress for flamenco style)
- Fingerboard: ebony or rosewood
- Bridge: ebony or rosewood
- Bracing struts and harmonic bars: spruce
- Back bars: mahogany
- Tentellones: spruce
- Linings (kerfed for back): mahogany, lime or spruce
- Tailblock: spruce, laminated into ply
- Bindings: rosewood, ebony or maple
- Purflings: maple in different colours
- Head veneer: rosewood or ebony
- Top nut and bridge saddle: bone
- Frets: medium-gauge nickel silver
- Glue: Titebond original and Pacer superglue



The exotic woods used, the line of the body (the plantilla), the finish, and above all the haunting sound, have encouraged me over time to make instruments modelled on the great masters of the Spanish tradition – Antonio de Torres, José Ramírez, Ignacio Fleta and José Romanillos to name but a few.

A little history

The Spanish classical guitar has a great history, starting with the tanbur of Persia or the chartar (char is the Persian word for four, and tar for strings), dating back as far as 1500 years BC. Its structural development owes most to Antonio de Torres (1817-92), who produced the overall dimensions still used today with little change by most serious makers.

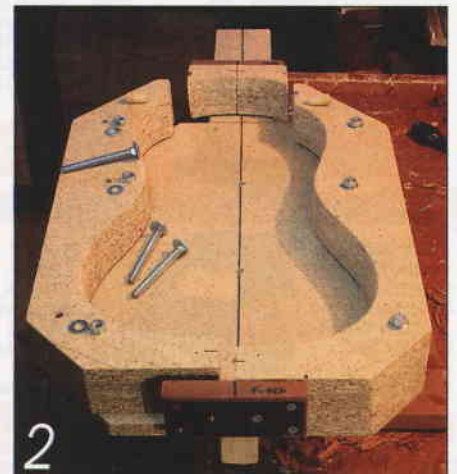
Musically, the single greatest debt is due to Andrés Segovia (1893-1987), who during over 70 years of performance single-handedly brought the instrument from a relatively obscure means of accompanying traditional songs and dance to the respected position as a concert instrument it now holds. This is an achievement unique in western musical history.

A little research

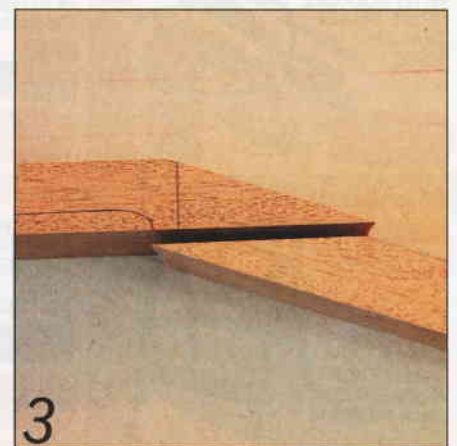
Before you start to make a guitar in the Spanish tradition, it's well worth a period of research. Consult the reading list at the end of this article to learn the names of the parts of the guitar, and spend some time absorbing the traditions of construction and



Some specialist guitar-making tools are essential

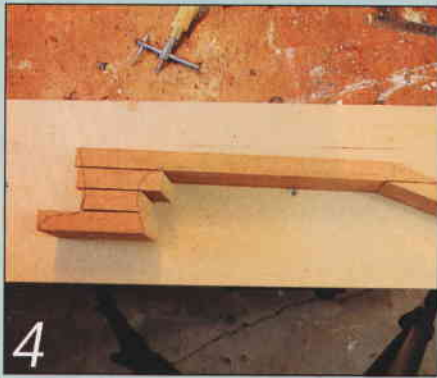


The mould can be made up from several layers of inexpensive chipboard



The headstock is created with a scarf joint at an angle to the neck





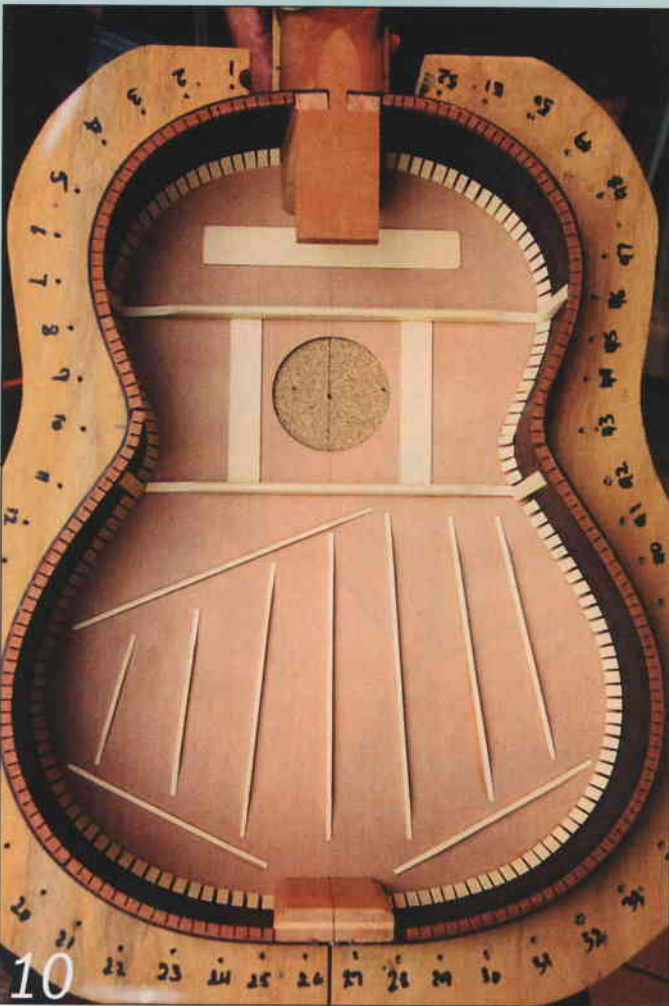
4 The heel block is built up by laminating billet offcuts together



5 The shape of the heel is roughly cut with a bowsaw



6 The machine head housings must be bored accurately



10 The inside view of the carcass showing the heel wedges



11 The two halves of the front are butt-jointed in the lace-and-wedge jig

the philosophy that informs the sound – it will be profitable.

Here are a few suggestions, drawn from my experiences:

- use the best materials you can afford – rosewood, spruce, ebony, cedar and so on – and fit good strings and machine heads;
- use the minimum of everything possible – glue, finish, thickness
- be prepared to invest at least 250 hours

traced from an existing instrument or drawn on graph paper from plans in the literature or from the internet.

The mould can be made from layers of chipboard, and has a flat back with a 2mm slope on the neck piece to allow for a slight tilt. This ensures string clearance over the frets. It should also have a slight dish in the centre to allow for the curvature on the front of the guitar.

of exacting but rewarding work
 ■ make, borrow or buy some specialist tools, **photo 1**.

What follows is but a brief resumé of the making of a Spanish guitar, but I hope it will serve to whet your appetite for the subject.

Start with the mould

First the mould for the guitar body must be created, with an outline

The sides of the mould must be made in two halves so it can be split to take the carcass out when gluing is complete. Coach bolts that pass right through the mould make assembly and disassembly quick and easy, **photo 2**.

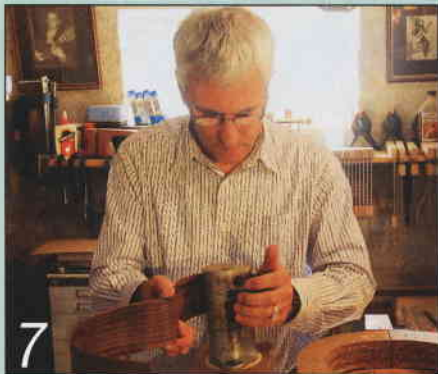
Getting a head

The next stage is to make the head and neck – usually from a single billet of cedar or mahogany about 1m long and 75mm wide. The headstock is created with a scarf joint, set at between 15 and 18° – **photo 3** – and the heel is built up by laminating parts removed from the end of the billet, **photo 4**.

The headstock should be veneered with 2mm rosewood or ebony, sometimes with further laminated veneer leaves to offer decoration. This helps to strengthen the scarf joint.

The heel is carved to shape – an exercise taken very seriously by many makers, as it offers the chance to demonstrate skill and individuality – but first the profile should be roughed out with a bowsaw, **photo 5**.

Care must be taken in boring the 10mm holes 35mm apart in the sides of the headstock, **photo 6**. Otherwise the machine heads will fit poorly and be stiff to operate.



7 The guitar sides are shaped using a hot bending iron



8 Once bent, the curved side sections are clamped into the mould



9 The tailblock fitted; an inlay can be added if desired



12 The front bracing struts are held in place with cam cramps



13 The ends of each strut and harmonic bar must be scalloped into a curve



14 Cutting the rosette channel in the front is best done with a mini-router

All alignment must be made whilst the headstock is still square to ensure symmetry. The headstock is then tapered by around 5mm each side.

Shaping the sides

Rosewood or maple, thickened to an even 2mm, are the preferred choices of wood for the guitar sides. Sound projection is enhanced by a curve in the back of the instrument, and this is achieved by tapering the sides slightly towards the heel from the waist area. The tail end of the instrument is around 10mm deeper than the heel end.

The sides must be bent to shape, and this is best achieved with a bending iron – one of the specialist tools recommended, **photo 7**. Few workshops now have a hot stove pipe – the traditional heat source used in many guitar workshops throughout Spain over the centuries.

A little practice on some offcuts will help you to master the bending technique. Once bent, the sides are fitted into the mould, **photo 8**. Then the tailblock can be positioned, followed by the head and neck.

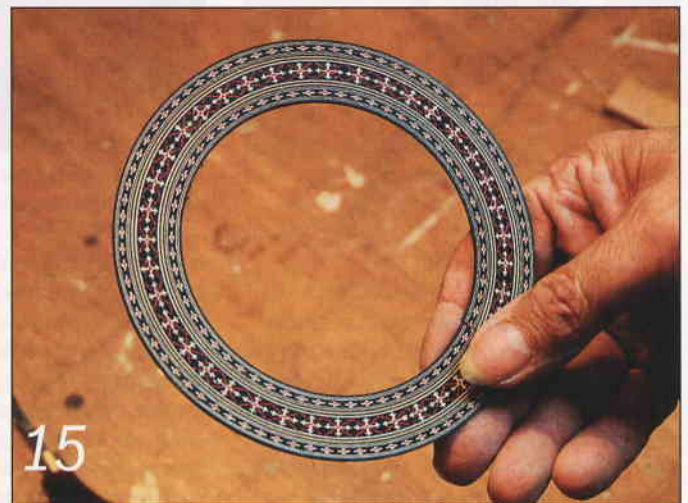
Before attaching the neck, a tailblock inlay can be added, **photo 9**. This helps to cover the join between the two sides where

they meet at the tail, and balances the decorative back inlay and purflings.

The sides are fitted by cutting 2mm slots in the heel. José Romanillos developed a wedged method for this which not only provides a very tight seal, but also adds strength as the wedges have an opposite grain direction to the heel. The wedges must be tapered only fractionally, and are pushed in from the inside, **photo 10**

A sound front

Creating the front of the instrument is possibly the most important task in the whole process. The front is principally responsible for the sound production of the instrument, which will be dull if it is made too heavily, and will not last if made too lightly.



15 An example of a ready-made rosette – one part that's worth buying

A finely-grained quarter-sawn spruce such as Engelmann is ideal, although Western Red cedar may also be used. There must be at least 40 grains to the inch, and preferably more.

The front is butt-jointed in the wedge-and-lace jig with the finest grain running near the centre, **photo 11**. Note that as the front is made of two 'bookmarked' halves, the grain direction changes as you plane first the



16

The simple chipboard jig that cramps the rosette in its channel



17

Small spruce triangles called tentellones hold the front in place



18

The mahogany back braces are fitted and their ends scalloped



22

A wire hanger is a handy accessory to help the finishing process



23

The bridge area is masked off with tape during finishing

24



Various styles of bridge in different stages of production

right and then the left side.

Once thickened to 2mm on the bass side and 2.5mm on the treble, the spruce bracing struts can be fitted, **photo 12**. In the days of Torres, these struts were flat; nowadays makers recognize the advantage of beam strength, and use struts that are deeper than they are wide. In any case they are no more than 3mm x 4mm. The two harmonic bars above and below the soundhole measure 7mm x 15mm.

The ends of each strut and harmonic bar must be scalloped with a parabolic curve, **photo 13**, to ensure that the ends do not produce pimples on the outside of the front when the guitar is strung.

Round in circles

The soundhole rosette offers a particular challenge. Some writers recommend chiselling the channel out by hand, but this

is very difficult even for the most skilled person. It's far easier to use a mini router with a trammeling base, **photo 14**.

It also seems unreasonable to me that many writers also suggest making your own rosette. Unless you are prepared to spend a few hundred hours gaining the experience necessary to make even a passable one, such rosettes will always look home made, and the result will be poor. Instead, buy one from a supplier – see the list at the end of this article – as they are inexpensive and very beautiful, **photo 15**.

A chipboard jig that bolts tight through the centre is useful for fitting the rosette, **photo 16**, but remember to line the inside with parcel tape to avoid gluing the whole thing up. If you soak the rosette in superglue once it has come out of the clamp, that will seal the mosaic surface and help to bring out the colour.

Assembly time

The front is placed into the mould under a rebate cut into the underside of the mould sides. The head and neck/sides assembly is then pushed in to secure a flush fit. Before fitting the front and the back, it is essential to ensure that the neck is held firmly in the mould by screws from beneath. The screw holes will later be hidden by the fingerboard.

The top then needs to be held in place, and this is done with 'tentellones' – small spruce triangles measuring 7mm high and 5mm wide, **photo 17**. These are pressed into place with tweezers and held through fast-grab aliphatic glue such as 'Titebond'. No cramping is required.

Adding the back

The two halves of the back are joined in the wedge-and-lace jig and thickened to 2mm across the whole. A piece of purfling can be placed between the inside edges of the back; this is not absolutely necessary, but is decorative.

More vital, however, is a crossbanding of spruce around 13mm wide running the length of the inside joint. This helps prevent the butt joint from cracking.



19

Examples of ready-made bindings and purflings - another component that's worth buying



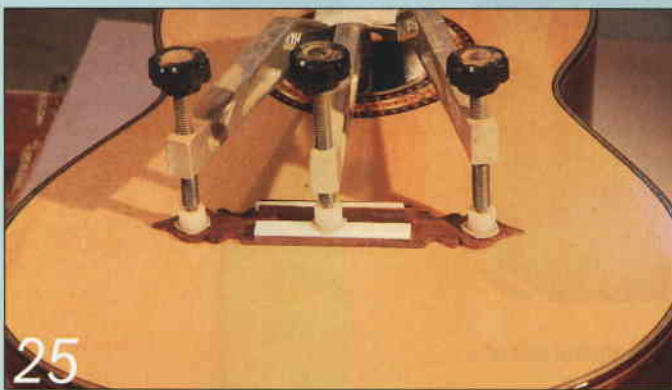
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Bindings and purflings are held in place with masking tape



21

The fingerboard in stages, with the frets roughly cut to size



25

The bridge is attached to the front using cam cramps



26

The machine heads are fitted into their housings in the headstock

Back braces can be made from spruce, though mahogany is the more common, **photo 18**. They must be 12mm high, 6mm wide, curved on the edge that meets the back, and slightly gabled.

Attaching the back to the sides is effected through the use of kerfed linings. These can be made from lime, spruce or mahogany and are held in place with clothes pegs as the Titebond dries. Once planed flush with the sides, the back can be fitted. The simplest way of holding the back down onto the sides is with large elastic bands or linen tape; alternatively you can use cam cramps if you have enough.

The guitar takes shape

At this point the instrument can be taken from the mould and has become three-dimensional. The bindings and purflings, **photo 19**, are fitted using a router to cut the channels and old-fashioned masking tape to hold them in place once bent, **photo 20**.

To help seal small gaps in the bindings before applying the finish a bead of 'Pacer Zap-a-Gap Green' superglue can be applied. This will not only seal any minor imperfections, but it will also help to bring out the colour of the purflings.

Fingers at the ready

Next comes the fingerboard, which is normally made of ebony, though rosewood can also be used. Cut the fret slots to half depth before fitting, and complete them once the fingerboard is in place, **photo 21**.

The ebony billet is normally planed to around 7mm thick, and is 54mm wide at the top nut and 64mm at fret 12. The frets are made from continuous lengths of fret wire; each is cut slightly over length and tapped in with a rubber headed hammer.



David Cottam, professional guitarist and composer, plays one of my guitars

FURTHER INFORMATION

Suppliers of guitar-making materials

■ Luthiers Supplies

The Hall, Horebeech Lane
Horam, near Heathfield
East Sussex TN210HR

■ 01435 812315

■ www.luthierssupplies.co.uk

■ Touchstone Tonewoods Ltd

44 Albert Road North
Reigate, Surrey RH29EZ

■ 01737 221064

■ www.touchstonetonewoods.co.uk

■ Stewart-MacDonald

Box 900, Athens, Ohio
45701 USA

■ www.stewmac.com

None of these suppliers requires a trade account, and all will dispatch orders promptly and with care.

Selected reading

Classical Guitar Construction by Irving Sloane (*Dutton 1966*).

An old publication now, but easy to follow with clear steps and clear naming of parts; usually available in libraries.

Making Master Guitars by Roy Courtnall (*Hale and Co 1993*)

Contains plans and diagrams from many of the great makers as well as detailed guidance on each stage of making.

Classical Guitar Making by John Bogdanovitch (*Sterling, New York 2007*).

The most recent publication on the subject; little new, but features very well-photographed steps.

If the fingerboard is planed absolutely flat before the frets are fitted, they will not require dressing down. However, if buzzes are heard whilst playing, some of the frets will need to be slightly reduced in height and recrowned.

Finishing the body

When the whole instrument is scraped down and cleaned up, it can be finished with oil, varnish, lacquer or French polish. A wire hanger is a useful aid in the finishing process, **photo 22**. Whatever finish is chosen should be applied minimally to avoid locking the sound in, and should be kept off the bridge area to enable the glue to penetrate. This can be done with a tape mask, **photo 23**, shaped by holding the bridge in place with cocktail sticks that pass through the saddle slot and on right through the front of the guitar.

Adding the bridge

The bridge can be made of rosewood or ebony and offers the opportunity for some individuality in design terms. To ensure a good string clearance, the bridge is normally thickened to around 10mm, and the side wings are left rectangular. However, some shaping of the bridge may be introduced if desired, and the tieblock can also be inlaid.

Some great makers such as Torres would often cover the tieblock with a thin sheet of bone. Most makers today seek to

blend this part of the guitar with the rest of the instrument, **photo 24**.

The bridge is attached to the front of the guitar using cam cramps, and these should be left in place for a few days before stringing up takes place, to guarantee that the adhesive has fully cured, **photo 25**.

The machine heads are then fitted into the housings drilled during the making of the headstock, **photo 26**, and once the bone top nut and saddle are in place, the strings can be put on.

Stringing and playing

It will take a few months of playing before the guitar has settled in and produced a good sound. It is essential to use good strings – D'Addario Normal Tension will usually do a good job – but a poor set will do great disrespect to the hours that will have been put into the making of the instrument.

Your second guitar will be much easier to make than the first, and over time you may not become a better maker, but you will most certainly become better at covering up your mistakes: you will make quite a few!!

