



## Building a 10-String Classical Guitar

by Michael McBroom

Entirely too many people find 10-string classical guitars intimidating - players and luthiers alike. As a player, I got over this difficulty about thirty years ago when I acquired my first 10-string. It was a Ramirez model 1A with a cedar top and Brazilian rosewood back and sides and was - and still is - a magnificent sounding instrument. As a

luthier who began building guitars many years after I began playing them, I decided that since I had played a 10-string for so long, there was really no reason why I should be intimidated by the thought of building one. So, armed perhaps with a touch of blissful ignorance as well as a can-do attitude, I decided to give it a go. And you know what? While it was a challenge building my first 10-string, it wasn't nearly as big of a challenge as building my first guitar.

Any attempt to present a thorough treatise on building a 10-string - or any guitar for that matter - is well beyond the scope of this article. The goal here is to lay out the salient points and differences with regard to 10-string construction, such that if you ever decide to build one for yourself, your first try will have the greatest chance of being a successful one. As a matter of necessity, I will assume that the reader already has a basic understanding of classical guitar construction. But first, this special instrument deserves a bit of an introduction.

The modern 10-string classical guitar is a result of a collaborative effort between the guitar virtuoso Narciso Yepes (1927-1997) and José Ramirez III (1922-1995). The first modern 10-string classical was built by Ramirez in 1964. Until quite recently the 10-string has been a rather obscure instrument, with Yepes having been by far its greatest proponent. In more recent years, however, it has been slowly gaining in popularity, which has been due in large part to the implacable efforts of a few individuals, most notably Janet Marlow , and even more recently, Stephen Bright, who runs the website and who moderates the "10-string" Yahoo group. The 10-string's growing popularity is found chiefly among players who wish to transcribe keyboard music as well as Baroque or Renaissance lute music to the guitar, where a full range of bass lines can be preserved, but it is by no means limited to this group of players.

In addition to an increasing number of compositions for the 10-string becoming available, much of the 6-string repertory can be successfully adapted and expanded for the 10-string. I have personally arranged pieces originally written for 6-string guitar for the 10-string, and I quite enjoy the results. Not only does the player have more fingering options available for negotiating sometimes difficult passages, but because a composer is often forced to restrict the bass lines because of the limitations of the 6-string, these impediments can be successfully removed with quite effective results. In addition, 10-string players are becoming more inventive with respect to tunings, which has further enhanced the repertory.

If you have ever played a 10-string, you'll no doubt have noticed a few things. Number one is a sense of mild to severe disorientation due to the extra four strings. This is a temporary condition, however, and a dedicated player can adapt to the new layout in as little as a few

weeks. The second thing you'll likely have noticed is the much different sound quality of the guitar. A 10-string doesn't sound like a 6-string classical. It has noticeably greater sustain, a more piano-like percussiveness, and a much greater range of overtones, which provide it with an almost harp-like quality, caused by the extra four strings as they resonate in sympathy with the notes that are plucked. And, of course, there is the extended range. Most 10-string players nowadays tune their guitars to what is usually referred to as "Baroque tuning," from low to high: ABCDEadgbe, where the low A is an octave below the open 5th string. A variety of tunings exist though, and players are limited only by their imaginations. Regardless of the tuning, a well made instrument should have loud resonant basses, while still managing clear bright trebles.

Regarding construction, the most common mistake a luthier makes when building a 10-string classical is a tendency to overbuild it. The best classical guitars are rather delicate instruments, and 10-strings are no exception. True, a 10-string must withstand approximately an extra 60 pounds of string tension, but there are minimal ways of bracing and reinforcing the instrument that do not sacrifice responsiveness or volume. Following is the way I build 10-string guitars, which is based to some extent on the pioneering efforts of José Ramirez III.

When it comes to the 10-string neck, it is best to think in terms of the guitar needing twice as much of everything. It requires two neck blanks, two fingerboards, and two sets of tuners (unless you elect to go with the 5-on-a-side tuners which are available from a few sources for premium prices). I also use a center reinforcement strip of ebony for neck rigidity. The reinforcement strip will come from an off-cut from the fingerboards. Despite its extra size, the headplate can usually be fabricated from book-matched off-cuts of the back wood from around the waist area.

I have built 10-strings using both mahogany and cedro (Spanish cedar) for the neck material. Mahogany is harder and denser, but heavier. Cedro, however, has been a traditional neck material used in classical guitar construction for many years. Given the extra mass of the neck any 10-string guitar will have when compared to a conventional instrument, I have begun to use cedro over mahogany in my more recent builds. It is easier to carve than mahogany and makes for a noticeably lighter instrument. When properly reinforced, a cedro neck will be more than sturdy enough to withstand the extra string tension.

I join the fingerboards first, using epoxy to insure the joint never fails. Then I trim about a 1" wide piece from one edge for the neck reinforcement strip. I cut the strip after joining the fingerboards because it is easier to plane smooth the edges to be joined on my shooting board if both fingerboards are approximately the same dimensions. After joining the fingerboards, I run the new, wide fingerboard through my thickness sander to reduce it until it is close to the final thickness. If the joint is nice and tight, it should now be invisible. If the ebony has some streaks, the joint might show, in which case you can apply dye to it to even out the color. I use Fiebing's Oil Dye for this, available from Stewart-MacDonald [link to [stewmac.com](http://stewmac.com) here?], and it works very well. After thicknessing, I lay out the fingerboard's dimensions on the joined blank. The nut width should be between 85mm and 86mm (I have built 10-strings with both 85mm and 86mm nut widths), and the width of the fingerboard at the 12th fret should be 100mm. The length of the saddle should be about 115mm.

The two neck pieces are laminated together with the ebony center strip sandwiched between them. I prefer to cut the center strip to the same width as the thickness of the neck shaft, such that its edge will be flush with the top surface of the neck shaft, which

means that it will come in contact with the underside of the fingerboard when it is glued down later. This creates a cross-sectional "T" configuration between the fingerboard and the center strip, resulting in an extremely rigid joint. With judicious planning and placement the reinforcement strip can be made such that you should have enough material to run from the tip of the headstock to the neck heel. I do not attempt to run the center strip through the heel. Rather, I cover it with the heel, the way Ramirez and others do. Ramirez does not have the reinforcement strip running the length of the headstock, and neither did I for my first couple of 10-strings. But I found it was actually more difficult to build the neck this way, so I've simplified things by just running the reinforcement strip only the length of the neck.



The neck shaft should be 27" (about 685mm) long and the scarf should be cut 11" (280mm) from one end. After gluing the scarf-cut headstock to the neck shaft, there will be about 10" (about 250mm) of total headstock length remaining. A 10-string's headstock needs to be at least 9" (about 230mm) in length. I prefer to keep it at 9" because I've found that it is possible for a 10-string with a shorter headstock to fit in some standard classical cases. This can end up being an important, money-saving consideration as you would otherwise have to shell out big bucks for a custom case. The tuner slots should be 7" (about 180mm) long, 5/8" (16mm) wide, and they should begin about 1" (25mm) above the nut. This will give the luthier about 1" of headstock above the tuner slots for carving their scrollwork. Typically, I taper my headstocks from a maximum width of about 4-1/4" (108mm) about 1" above the nut to about 2-1/2" (64mm) at the tip of the headstock.

I have built 10-strings with necks that use the traditional one-piece Spanish foot with integral heel block, and I have built them with bolt-on necks with separate heel blocks. I have found that one method is not particularly faster nor superior to the other, although it is definitely easier to shape the heel with the bolt-on neck. But in all cases, I have learned that if the heel block is wider at the top to support the extra width of the top surface of the neck, the joint between the neck heel and the sides will be tighter, thus the chance for a gap between the heel and sides is reduced.

I prepare 10-string soundboards no differently than 6-string ones: same thickness, same bracing patterns and size, same soundhole size and placement. The only difference is the size of the bridge and bridge pad. Most classical bridges are about 7-1/4" by 1-1/8" (about 185mm by 30mm). For a 10-string, the bridge length needs to be increased. There is a fair amount of variability in bridge length among the various 10-string guitars I have examined, with most falling somewhere between 8-1/2" and 9" (215mm to 230mm) in length. I have used both 8-1/2" and 9" as bridge lengths with my own 10-string guitars. The width of the bridge does not need to be changed. On the underside of the soundboard, the bridge pad should be about the same dimensions as the bridge. These two features are important. The bridge and the bridge pad are responsible for withstanding almost all the additional tension caused by the extra strings, so the extra length is important. It is also possible that one of the reasons for a 10-string's increased sustain is the extra bridge length.

Once the fret slots have been cut, the fingerboard is glued to the neck and soundboard. I have fabricated an oversized gluing caul just for 10-string fingerboards, which includes a

small extension that will cover up to the 22nd fret, if required. After the fingerboard is glued in place, I then contour it so that the bass strings will have extra clearance. Typically I remove about 1/8" of material from the bass side of the fingerboard with a block plane, tapering the contour as smoothly as possible. After this, I have a large billet of aluminum - about 10" x 3" x 1-1/2" to which I have affixed some 80 grit sand paper with a spray adhesive; I take out any irregularities from the planing process with this tool.

Next, many if not most of the fret slots will need to be re-cut because of the fingerboard being tapered. I prefer to tape up the upper bout very well before doing this. All it takes is one slip, and there goes all your work on a premium grade top set.

You'll note from the photos the way the fingerboard angles in toward the sound hole. This sort of treatment has been around for a couple hundred years or so, and makes a certain amount of sense on a 10-string, in that it frees up some soundboard area for sound production. However some luthiers, most notably Rubio and Hauser III, construct their 10-strings without the angle in the fingerboard. Either way, the extra size of the fingerboard, combined with an oversize heel block underneath it provides even more rigidity to the structure.

It can be extremely difficult to find nuts and saddles of the correct length for a 10-string. I haven't been able to find any. Basically, there are two ways you can go, and a lot of your decision depends upon personal preference. You can cut the nut and saddle you need from a slab of Corian (it cuts easily on a band saw), which can be obtained quite reasonably from a variety of sources, or you can use two nuts and two saddles. Some luthiers don't like Corian, claiming bone is better. I've used Corian on a lot of my builds, however, and honestly I don't notice a difference between it and bone. Of course, the downside to using multiple pieces of bone for the nut and saddle is that there will be seams. There is not much one can do about that, but this practice is not uncommon. I have suggested that, if a luthier is concerned about buzzes from the two pieces rubbing where they butt up against each other, they can be separated by a thin piece of veneer or purfling.

Finally, here are some concepts about tuners for the 10-string. There are a variety of ways one can go here. One can buy the five-on-a-plate tuners made by Alessi, Fustero, and others, or one can buy the single tuners made by Gilbert, or one can do as 10-string builders have been doing for decades - cutting down three-on-a-plate tuners. Unless my client is paying for premium tuners, I use the deluxe Hauser-style ones made by Schaller, and cut them to fit. Why? Because I feel that the Schaller tuners are some of the best performing tuners available anywhere at any price and, of course, because of price. I prefer to cut the tuners along the centerline of the screw hole between the 2nd and 3rd keys on one set, and then just cut the tip off another set, still along the centerline of the screw hole. When installed, the resulting cut line is not really noticeable unless one is really looking for it.

What I have laid before you are literally the keys to the kingdom of 10-string guitar building. The Spanish masters do not willingly divulge this information, yet ironically the direct results of their efforts are in plain view. Anyone who has the ability and desire to examine them closely can learn many of their secrets. The remainder is learned the old fashioned way - by doing. True, I haven't shown you every step involved in the process of constructing a 10-string, but I have presented you with sufficient information that the undertaking is no longer a reach into the unknown.