

Guitar Necks and Fret Boards

Different construction techniques, why it matters.

You may be wondering why I'm devoting a whole section to necks. I've got two main reasons. First, the neck is your interface with the guitar. If it's not a perfect neck, it'll never be the perfect guitar. Second, even though I make really innovative and pretty cool guitar bodies, I think I make some of the best necks in the guitar industry. I make necks for several other companies, so I must be on to something. I've personally made over 1,000 necks for guitars, basses, and banjos, so I do consider *myself to be highly qualified on the subject.*



To the left is my standard headstock. The slot in the middle of the neck is where you adjust the truss rod. I'd also like to remind you at this time, and if you'll look at the spot just above the nut, my guitar are made in America.

You might ask, what makes a good neck, and there are several things. Like the saying says, there's more than one way to skin a cat. I've never actually skinned a cat, but I have tried most of the different techniques on making a neck. There are several different ways to make a good neck, and there are several ways to cut corners and make a bad neck. A lot of companies make excellent necks, by no means am I the only one. Some companies cut a lot of corners on their necks, and I'll point out some of the features of good and bad so you can make an informed choice.

Anatomy of a Guitar Neck

A good neck has several components. There is the neck itself, the fret board, the truss rod, fret markers, the finish, and the frets.

The Basic Neck

A guitar neck is a piece of wood, but there can be a lot more to it than that. There are four common ways to make a guitar neck: flat sawn, quarter-sawn, book-matched, and multi-piece. Most wood is commonly cut flat sawn, which is where the orientation of the grain is horizontal if you look at the end of the board or neck blank. Quarter-sawn has the grain oriented vertically, and book-matching is done by taking a piece of flat-sawn wood, cutting it in half, and gluing it together with the grain facing vertically, but with the grain curve of each piece facing the opposite direction of the other. Multi-piece necks are several pieces laminated together. The piece of wood below on the left is one of my neck blanks, it is book-matched, the one on the right is a finished multi-piece neck made from maple and walnut.



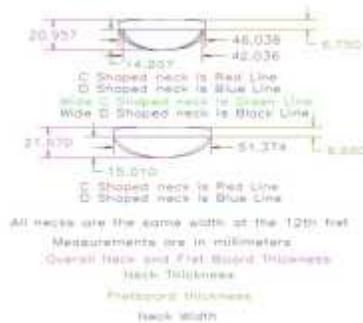
A flat-sawn neck is the most common especially in electric guitars. They have a lower string tension than an acoustic, and with a truss rod, a flat sawn neck is usually sufficient, however, it is more prone to bowing up or down. Flat-sawing wood gets the most yield out of a log, and therefore is a cheaper, more economical wood. All you have to do is cut the board down into a neck blank and start shaping.

Quarter-sawn wood has the grain in the opposite orientation as flat sawn. The log is actually cut into quarters, then sawn into boards. That is how it gets its name. It is not as economical as flat sawing, but does make a more stable neck. However, due to all the grain orienting the same direction, quarter-sawn necks can bend to the left or right, but it is extremely rare. It is also extremely hard to find good quantities of quarter-sawn wood.

Book-matched necks use the more economical flat sawn wood, but it takes several steps to cut the wood, joint a smooth face on it, and then glue the two pieces together. However, each piece is oppositely oriented, so if one piece warps or bends, the other is going the opposite direction, so the wood tends to stay stable. Book-matching was shown to me by a friend who used to make traditional acoustics, and was a classically trained luthier. He told me that the best acoustic necks were book-matched. So, I figured it'd be good for all of my necks.

Multi-piece necks are like a big piece of plywood. They are very stable, but take a lot more time to prep the wood. I use it occasionally on some necks, and it can be an option on your guitar.

I've given a brief overview of neck wood construction, now I want to make a neck that fits your playing style. I offer several shapes of necks and two widths. The shapes are a C-shape, a D-shape, and a V-shape. On the picture below, I have a screen print off of my CAD/CAM system going over the different sizes. The C shape is similar to a Fender(TM) neck, the D shape is boxier and more similar to a Gibson(TM) neck. The V-shape is, well, V-shaped. I did copy a Fender(TM) style V, but it's not exact. If you look at the drawing, you can see that all of the necks are actually the same width and depth, just the profile is different. The wide necks are 4mm wider than the standard neck. All of the necks are the same width and depth at the 12th fret.



On my standard models, I use hard maple for the necks. Walnut is another wood that works extremely well too, and I've had good results with several other woods. If you want something that is different, ask, I may have tried it before. I want to make a guitar that you will love for years, and the more I talk with you about it, the more likely the guitar will be exactly what you're hoping for.

Fret Board

It's just another piece of wood on the neck, right, what's the big deal? Your fret board has a huge impact on the tone of your guitar, and it's getting harder and harder to get good wood (for fret boards). First of all, what does it do? The fret board has the frets mounted to it, and it is the hard playing surface of your guitar neck. It is a wear item, and can and will wear grooves in it if you play it a lot, and for a long time. So, harder and denser tends to hold up better than softer and porous. They also tend to look better over time as the porous woods tend to be lighter in color, soak up sweat and grime, and generally look grungy. There are two main tasks for a fret board: Hold the frets in place without allowing movement, and help to improve the tone of the instrument.

There are several common types of woods used for fret boards. I'm not going to list them all here, but I'm putting a link in for the fret board wood page at Luthier's Mercantile, which is where I buy most of my fret board woods from. www.lmii.com

There are three major types of fret board surfaces, flat, single radius, and compound radius. Flat radius finger boards are used on some classical guitars, and also on some banjo's. It is more of a traditional fret board, they are not as comfortable to play on as a fret board with a single or compound radius.

A single radius fret board is simple to manufacture, and is more comfortable than a flat radius fret board as it conforms more to your fingers.

The difference between a single radius and a compound radius is that on a single radius, the board is the same radius from the nut to the other end, for example, 7 1/2" on a vintage Fender (TM), or 14" on an Ibanez (TM) A compound radius will be rounder (smaller diameter) at the nut, and a larger diameter at the other end. The main advantage of a compound radius is that you can get the strings lower, and they won't bottom out on an adjacent string when you bend notes. They are harder to make than a single radius, but they are a little more comfortable to play than a single radius fret board because you can get the string action lower.

Over the years, I've probably made over a thousand guitar necks, I'm pretty good at it, and I've also talked with several customers about their preferences. Based off of customer review, and also my personal preference matches this: The roundness of the fret board makes a huge difference on your playing style. A rounder (Smaller radius) fret board will make it easier to hold chords, but it is a little harder to play faster as you are moving around the neck, not across it. A flatter fret board (Larger radius) is nice for speed, but is hard to hold chords on for extensive periods.

The nice thing about a compound radius board is that it is rounder at the nut end, which is where you are playing chords, and is flatter at the body end, which is where you are soloing.

The question is, how much roundness do you need, and can I make it for you. My answer is, I'm not sure without talking to you, and yes, I can make it.

I've mentioned in other sections on the website how my guitars are entirely computer drafted, and cut on a computer controlled milling machine. I've made dozens of different compound neck radii over the years, and I still have the CAD files, so I can make them again. If I don't have it, I can still make it. So, you just have to decide what radii work best for you.

My most common radii are a 6" in to 8", which is reminiscent of the vintage Strat(TM), and a 12" to 16" radii, which is similar to an Ibanez(TM). The latter is my most commonly preferred fret board.

In addition to wood, I also offer black, cast acrylic as a fret board. It is one of the fastest necks that I make. In addition to being fast, it is also weather proof, grime proof, and extremely durable. It is denser than ebony, and much harder. In 17 years, I haven't seen one with wear marks yet, and you can wax it with the same wax you use on the guitar. The cool thing with acrylic is that it has no grain structure, so there is nothing for the string to dig into or grab onto. It makes for the smoothest, biggest bends you'll ever get on a guitar neck. It is an option available on any of my guitars.

Frets

We are slowly working through the minute details of the guitar, on this page, I want to give you some information on the frets and fret markers, and also why I think that how you install the fret makes a huge difference on the sustain and overall tone of the guitar.

There are tons of frets out there, I buy mine from Steward-MacDonald, one of the premier suppliers of guitar parts in this country. They also provide excellent descriptions of the product, and have a really informative website. You guessed it, I'm not going to copy it, but provide you with the link to see their page on frets. They have comparisons of what their model numbers are similar to, and since they are where I buy my frets from, if you see it there, I either already have it, or it will be no problem to order it for you. www.stewmac.com

My standard fret is the Stew-Mac 148. I use it on all of my stock acoustics and electrics. On the basses I use Stew-Mac 154. Like I mentioned above, if you see it on Stew-Mac and want it, I can get it and use it for you. It's going to be your guitar, I'm just the builder, so let's make it exactly what you want.

WARNING: Most mass produced guitars have a lot of variation in the quality of the fret work. When the frets are all different heights, they have to be leveled, re-crowned, and then polished. You can lose a lot of height, so the actual finished fret may not be the same height as what it states it is. I'm not trying to brag, but I very rarely have to level a fret board as I take extreme care in my fretting process.

There are several ways to put frets into a guitar, you can hammer, press fit, glue in, or use a combination. I use a combination of all three, and have several reasons for doing so. Hammering is just faster, however, the down side is that the frets may not stay seated and be springy. Press fitting is slow, but can be less traumatic on the fret board (or whacking your fingers with the fretting hammer). Gluing works well, but the traditional glue method of having a wide open slot that is wider than the tangs doesn't work for me. So, what I do is cut my slots to the size recommended for that size fret wire, put some glue into the slot, then hammer in the fret, and clamp it in a negative fixture of the fret board radius. When the glue is dry, you have an extremely stable fret board.



The picture to the left shows the side of my neck. If you zoom in, you can see how no fret tang is visible.

One thing that no one really notices on the guitar is the fret slot. There are three types of fret/fretting options on a guitar. Open fret slots, blind fret slots, and a bound fret board. Open fret slots are the cheapest way to make a guitar. The slots run all the way to the edge of the neck.

To me, the absolute worst way to fret a neck is to have the fret tangs exposed. I've seen it on cheap guitars, and also on guitars costing several thousand dollars and it is inexcusable as well as a potential safety hazard. This is because the wood on the neck and fret board can shrink over time, but the fret won't. Then the tang, which is sharp, can stick out and cut your hand as you're playing. The fret tang should be cut back and the slot filled with a filler or a small sliver of wood. I've got a low priced Aria(TM) electric that I've had for almost 30 years, and it has the slots back-filled, and it plays like a dream. If that can be done on a lower priced instrument, why aren't the "Premium" manufacturers doing it on their guitars?

Blind fret slots are where the slot is stopped before the edge of the fret board. I cut my slots with a cutter that is .023 in diameter, it stops about 2 mm before the edge of the fret board. The frets are cut slightly long, then the tangs are cut back. There is usually a little metal left from the fret nipper, so then the underside of the fret needs to be filed smooth. I then fret the board using the procedure I mentioned earlier.

There are two ways to bind a fret board, the first is cutting the slots all the way through, then adding a strip of wood to the edges of the fret board and sanding flush. This will also give you the same effect as a blind fret slot, and it is fretted the same way.

The second way to bind a fret board is you have open slots, put the frets in and file them so that the ends are perpendicular to the edge of the fret board. A binding material(plastic or wood) is then added to the edge of the neck covering the end of the fret. The entire binding above the fret board must then be sanded down to even with the fret board, leaving little plastic nubs even with the end of the frets. Those are gently rounded over, and the fret board is finished. This is considered the best way to fret a fret board, but it is extremely time consuming. The two downsides are the binding can come loose, and it is extremely hard to re-fret one without losing the nubs on the end.

If you've made it this far, I know it was pretty dry reading, but hopefully will help you make an informed choice when you are buying your next guitar. I hope you buy from me, but what I wrote will apply to any guitar on the market. I am one of the few manufacturers that will let you pick options on every aspect of the neck and not upgrade you to a "custom shop" price change.