



Guitar Virtual Learning

Guitar Materials

May 13, 2020



Guitar

Lesson: May 13, 2020

Objective/Learning Target:

What materials do guitar makers use to build guitars, and how do different materials used change the guitar?

Warm-Up Activity

Watch this short video of a 360° image of an acoustic guitar. What parts are made out of wood, and what parts might be made out of something else?



2nd Warm-Up Activity



The guitar on the left is made out of carbon fiber. The guitar on the right is made out of wood. How do you think this might make them sound or play differently?





Materials That Make a Guitar

We have been learning about the different components of acoustic and electric guitars. While the differences in components show us the differences between steel string, classical, and electric guitars, the materials guitars are built with can also make them very different from each other.

Today, we will briefly touch on the non-wooden materials used to build guitars, then spend a lot of time learning about all the different types of wood and how they shape guitars' sound.

Non-Wooden parts to a guitar

On most acoustic and electric guitars, the majority of the instrument is made out of some kind of wood. But some important pieces are not. This is usually because the pieces need to be stronger or able to take more tension than wood can handle.



Strings

This one is probably obvious, but on all types of guitars, the strings are made out of some combination of nylon or different types of metal.



Tuning Pegs

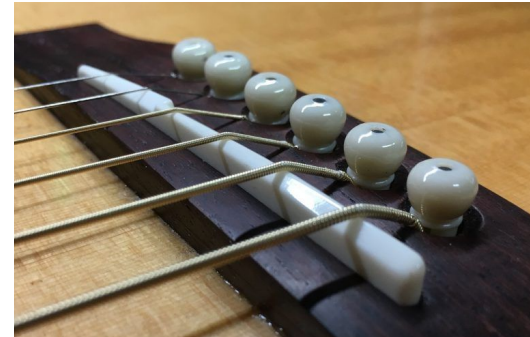
Tuning pegs on guitars are made out of metal.

Sometimes the handles are made out of other material, and often on classical guitars the bars that house the strings are made out of plastic.



Nuts and Saddles

The nut and saddle of the guitar hold either end of the strings and bookend the vibrating length of the string. They are traditionally made out of animal bone, but due to cost and increased awareness of animal cruelty, they are oftentimes made out of other synthetic materials (such as plastic, metal or TUSQ).



Pickups and microphones

Electric guitars (and some acoustic guitars) have small electric microphones called pickups that “pick up” the strings sound as it vibrates. They then send that sound through wires to a preamp that sends it out of the guitar to an amplifier. The pickups, wires, preamps, and on-board tuners are all build out of metal and plastic.



HUMBUCKER



DIMEBUCKER
BLADES



INVADER
HEX POLE PIECES



P-RAILS
SINGLE COIL/HUMBUCKER/
P-90 ALL IN ONE



SINGLE COIL STRAT



SINGLE COIL SIZED
HUMBUCKER



HOT RAILS



LIPSTICK TUBE



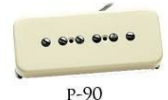
ACTIVE PICKUPS



TELECASTER



MINI-HUMBUCKER



P-90



GRETSCH
FILTERTRON



GRETSCH
DYNASONIC



GRETSCH TALLBOY
SINGLE COIL P-90

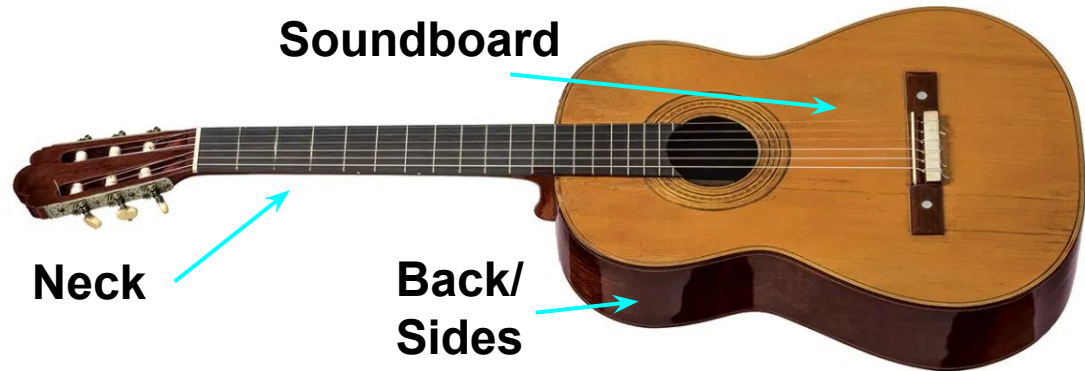


CHARLIE CHRISTIAN
PICKUP

Guitar Wood

On acoustic guitars, the single most important material used in the making of the guitar is the wood that makes up the **soundboard**, **back/sides**, and **neck** of the guitar.

Different types of wood have a great impact on the sound the guitar produces!



Tonewoods

Not all wood is the same! Wood from different species of trees can vary greatly in strength, flexibility, durability, density, and color and look. When creating the soundboard and backs and sides of the guitar, most luthiers (guitar makers) prefer to use “**tonewoods**”.





Tonewoods

Tonewoods are species of wood that, due to their particular density or growth pattern, naturally have a lot of resonance and ring to them.

Some tonewoods are considered good for the soundboard of the guitar, some are considered good for the body (back and sides) of the guitar, and some are considered good for the neck and fretboard of the guitar. We are going to briefly learn about some of the major tonewoods guitars are made from!

Spruce

Spruce is the king of tonewoods. It is far and away the most common wood used for soundboards, due to its tremendous resonance and availability. There are many different species of spruce that impact the sound of a guitar a little differently. It is also a wood that grows in many places and is relatively easy to work with.



Cedar

Cedar is another very common tonewood for making soundboards. It tends to bring out the darker, quieter sound from the strings. Cedar is the most common wood choice for classical-style guitars. It has a redder color than spruce, which appeals to some people more.



Mahogany

Mahogany is a denser, stiffer wood than spruce or cedar, and because of that, it tends to give the strings a more woody, dark sound. It typically emphasizes the midrange of a guitar, meaning the middle notes come out more clearly than high or low notes. Mahogany is most often used for back and sides, but also is used as a soundboard wood occasionally, and for the neck since it is so strong.



Rosewood

Rosewood is a floral-smelling, rich colored hardwood that has long been considered one of the best woods to use for backs and sides. Where mahogany brings out the midrange, rosewood typically accents the bass and treble notes. Unfortunately, due to irresponsible harvesting, rosewood has become an endangered species, and is being used much less now since it is harder to get.



Maple

Maple is a hardwood found in America that is known for being incredibly dense and helps a guitar to project. When used for back and sides of a guitar, it give off a very bright sound. Because of how hard it is, it is also used for necks and fretboards. It is also one of the most common woods used for building the bodies of electric guitars.



Sapele

Sapele is a wood found in Africa similar to mahogany. As a back and sides wood, it shares some characteristics with mahogany and some with rosewood. It is much more readily available than either of those woods, and is becoming embraced more as a wood that can be sustainably sourced without harming ecosystems. Like mahogany, it also gets used for building necks of guitars.



Koa

Found in forests in Hawaii, **Koa** is a beautiful, rich-colored wood that makes both looks and sounds stunning on guitars. It shares some of the richness of sound of mahogany but also emphasises the chiming treble notes and rich bass notes you normally hear from rosewood. Due to only growing in one small place, koa can only be harvested in very limited amounts, making it a very expensive wood to use.



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Ebony

Harvested mainly in Africa, ebony is one of the hardest, darkest and densest woods in existence. In guitar building, it is rarely used for the body of the guitar. However, along with rosewood, ebony is one of the most common woods used for fretboards, bridges and headstock plates. It is very smooth and typically does not need to have a finish put on it to preserve itself.





Sustainability

In the last 20 years, there has been a large shift in the guitar making industry. Some woods (rosewood, ebony, mahogany) that have long been prized for use not only in guitars but also furniture and deck making have suddenly become scarce as the result of over-foresteing. Some companies, most notably **Taylor Guitars** and **Breedlove Guitars**, have changed the industry by make it a part of their company's goal to only harvest their woods in sustainable and responsible ways.

Sustainability

Some things these companies have done to help protect the future of guitar making:

- Experiment with alternative wood choices that grown in more abundance, such as myrtlewood, walnut, sapele or ovankol.
- Sustainably farm these woods instead of cutting down existing forests.
- Empower and employ local communities in third-world countries to help them grow these woods responsibly

Alternative materials

In an effort to try and build a more durable guitar that doesn't use wood at all, some companies have tried other materials entirely. The most common alternative is **carbon fiber**. Carbon fiber guitars are useful for their strength and durability, and also for being able to shape guitars in new ways.



Follow-Up Activity

Watch this video of Bob Taylor from Taylor Guitars explain why his company decided to buy their own ebony farm to help ensure that their ebony was being sourced in a sustainable way.





2nd Follow-Up Activity

Watch this video by YouTuber David Braun comparing a traditional wooden acoustic guitar (in this case, a Stonebridge guitar) and a carbon fiber guitar (Rainsong brand). Both guitars cost around \$2500-\$3500 to purchase new, so theoretically the build quality is similar. They are both steel-string guitars with similar body shapes. The only significant difference is the materials they are made out of.

As you watch and listen, try and describe the differences and similarities you hear in the guitars tones. Which do you like better?

2nd Follow-Up Activity





3rd Follow-Up Activity

Now, let's compare two similar guitars that use different soundboard tonewoods. Both of these guitars are built by the same company, they are the same body shape, and are the same quality of build. One has a spruce top, and the other has a mahogany top. Once again, see if you can hear a difference!

Note: When comparing these sounds, it is easier to hear a difference if you are using headphones or good quality speakers, since the differences are subtle. I would also listen in a quiet room if you can.

3rd Follow-Up Activity



AL

000-18 VS 000-15M
MARTIN TOP WOOD BATTLE
★★★★★