

FROM A LUTHIER'S NOTES:
MORE THOUGHTS ON DOUBLE TOPS
by Sebastian Stenzel

In 2002 to I published some thoughts on double top guitars in this series "*From a Luthier's Notes*".¹ It got me the reputation of being against double top guitars. This was never true, but even though huge improvements in double top construction have been made in the last 20 years, it is still true that I don't much like most of them, and for the same reasons I had outlined in the mentioned article.

Nevertheless, I am making my own type of double tops for already 15 years now, an invention I called "Enhanced Wood" Soundboards. Actually, they are more double top than most, because they consist of a double layers of wood, while most other double tops, e.g., the most common with a core of Nomex, have three layers and could therefore be called triple tops.

My main criticism with the common double tops is based on my conviction that any musical instrument has developed in an iterative process which was driven by the relations between the demands on its functions (to sound in a certain way, for example) and the properties of the materials form which it could be made. This evolution, as this process might well be called, led to the appearance, its genotype as it were, of the instruments which have survived the selection, to stay within the metaphor of evolution.²

One of the most significant properties of wood is its anisotropy, namely, its direction-dependent stiffness. The genotype of the guitars we know have developed around this given property. Most double top guitars destroy the anisotropy of the soundboard completely, which is one of the main reasons why many of them lack a nuanced sound. The other reason is that they are often too stiff to work well in higher order vibrational modes, which are hugely important for interesting overtones. And without good overtones, there is, of course, no good balance.

Some makers now try to give some anisotropy back to their double tops by, for example, using fish grain pattern of balsa wood, or arranging holes in a slanted pattern. The fact that this trend has not developed further shows, however, that the

¹ <https://stenzel-guitars.de/resources/pdf/trad.vs.modern.pdf>

² These thoughts I have elaborated in "Some Thoughts about the Development of Musical Instruments" given as keynote lecture at the conference "Instrument Making between Tradition and Innovation", Markneukirchen 2024 https://libdoc.whz.de/opus4/frontdoor/deliver/index/docId/18047/file/01_MTI_Stenzel.pdf (German)

basic cause of the problem has not been understood yet by the majority of double top makers.

I suspect that a reason for this pause in development might be that maker of stringed instruments are blinded by the so-called tone wood coefficient as a quality parameter for tone wood. The tone wood coefficient is the ratio of sound velocity (along the fiber) to mass. Simpler put: stiffness to density (because the stiffness correlates fairly linearly to sound velocity). Still simpler said: the lighter the better, the stiffer the better. Notwithstanding that the tone wood coefficient says nothing about the damping, which in my opinion is a more important parameter than both stiffness and mass, it is, although not entirely wrong, only a very dull tool to judge tone wood material.

According to the tone wood coefficient, many guitars made by Hermann Hauser I would have to be graded not AAA, not even B, but F for firewood. You can make a superior wine from sour grapes.

According to the tone wood coefficient, there should be nothing better than a Nomex double top.

Below is a table comparing different types of double tops and their performance in aspects that I find important.

Reference ($\pm$) is a soundboard of solid wood. A + means the aspect is improved, a - it is reduced.

	NOMEX DOUBLE TOP	SOLID BALSA DOUBLE TOP	FISHBONE PATTERN BALSA DOUBLE TOP	HOLE PATTERN DOUBLE TOP	ENHANCED WOOD TOP
Apparent loudness	+++	+	++	+	+
Richness of tone colour	---	-	$\pm$	$\pm$	+++
Malleability of sound	$\pm$	-	-	-	+++
Sustain	+	$\pm$	+	+	+
Balance	--	-	-	-	++
Projection	-	$\pm$	$\pm$	$\pm$	+

This table, I admit, is so debatable that I hesitate to publish it, but certainly it is a good basis for a discussion. It is highly debatable, because the properties of the

soundboard depend on many details and their execution, much more than just the basic type of construction. We all know that the reference I chose, a soundboard of solid wood, can be very good or very bad. The same holds true for any other soundboard type. Still you can point out tendencies. Let's look at the richness of tone colours, for example: the reason, why many Nomex double tops lack richness of sound colours, is that while they out-perform any other type in low frequencies, they are usually too stiff and thick to vibrate well in higher modes. The opposite is the case with the Enhanced Wood Soundboard: because it allows the soundboard to be made extremely thin, its enhanced anisotropy (hence its name), and - in defiance of the tone wood coefficient - having a slightly higher density, which gives the higher modes more energy, it lets the higher modes work better and it excels in this aspect.

All these points warrant a thorough discussion and, in fact, require research, which, alas, I don't have the time nor the means to undertake myself.

Sometimes I say that even a wooden drawer sounds when you put strings on it. That is to say that it is very easy to produce "some" sound, but it is very difficult to build a tool for sound productions that allows the musician to articulate him/herself in a nuanced way. Just think of how long it took for electric pianos to achieve a tonal malleability acceptable to at least some professional players. And the piano is less complex in that respect than guitars, lutes and ouds.

Once more, let me emphasise that I am not against Nomex double tops. The mere timbre of a guitar is but one of its aspects important to the player. The energy necessary to produce a good sound, or the feeling to be heard, are other important aspects. And for some players, these have greater importance. I am all in favour of variety, and there are as many types of sound ideals as there are musicians and instrument makers. In the great, mysterious space of music, it's not only the music itself, but also the instruments, which weave the magical fabric that makes music the universal language.

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