Feature Article 1

Making a double neck acoustic guitar

By Richard Heeres

Last year I was asked to build a guitar for singer/songwriter Terence Hansen, from Salt Lake City, Utah. Terence has developed a unique style of guitar playing: simultaneously on two guitars. He does not play the notes by strumming with one hand and fretting with the other, but rather uses a tapping technique in which each hand plays it's own neck.
For his electrics, he has a stand that holds the guitars, one just behind the other, at the right angle. This is not an option for his acoustics as the body depth would place the guitars too far apart.
Formerly, he had a hard time playing acoustic, placing one guitar on his knee and the other in a awkward position on the ground.
So the instruction was that the new instrument would have to have two necks, at an angle of approximately 40º.

Other than that I had complete freedom in both design and execution. Although most of my work is traditional, I make mostly archtops and flamenco guitars, I made use of this freedom by applying some modern techniques that I had seen and/or used before. Mindful of the player and the instrument, of course.

What follows below is a description of the considerations and the building process of this double neck acoustic guitar. It does not set out to be complete: I assume the reader knows how guitars are built. Therefore, only the (to my traditional mind) modern techniques are described.

Design


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Since there would be enough unknown factors in this guitar, I decided to stick to what I know for materials and shape. So I chose a European spruce top, Honduran Mahogany necks and East Indian Rosewood back and sides. It has a small jumbo shape, which I knew from experience, works well with this combination of woods.


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After some consideration it seemed a good idea to let the strings of the sloping neck cross those of the normal neck above the sound hole. I had three reasons for this: First, the second bridge could be placed between two feather braces **photo 1**,


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helping to avoid deformation of the top. Second, I hoped for more volume for the second neck by making the second bridge the higher one (and thus giving the strings a greater breakover angle). The second bridge would be close to the side, driving a smaller portion of the top than the 'normal' bridge, so any increase in volume was welcome.


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Third, it doesn't

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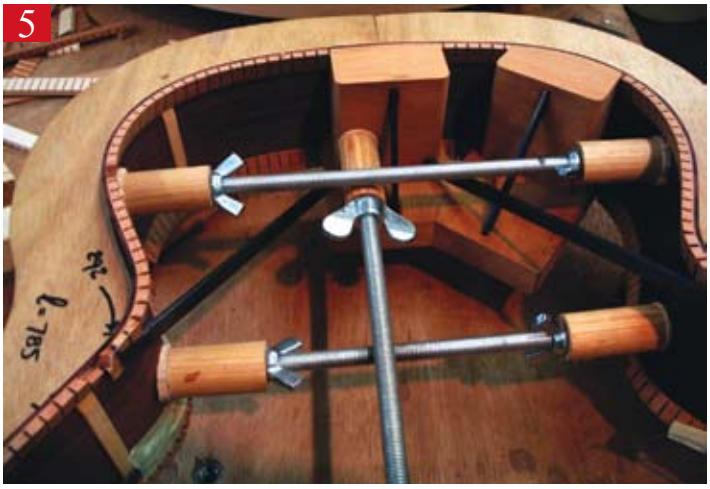

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really matter where the strings cross. As mentioned, Terence doesn't need to strum to make them ring.

As a bonus, you could use the instrument like a normal guitar by removing the 2nd set of strings.

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Protection and transportation

A case would have to be tailor-made. If the necks were fixed it would have to be a monstrously big one. I decided to make both necks removable, so they could be stacked under the body for transportation. Terence travels a lot, so that seemed like a good feature. Another advantage of removable necks is that the neck angle remains adjustable. I lay it upon myself that assembly and disassembly should not take more than, say, 5 minutes.

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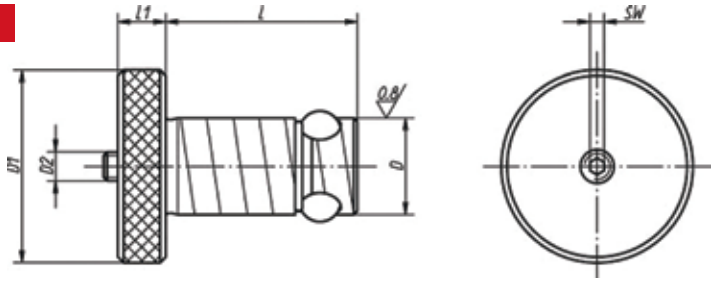

Neck construction

The neck construction consists of two neck blocks with an extension glued onto them that runs right up the 1st transverse brace **photos 2, 3**. The extensions are big enough to rout out a neck pocket **photo 4**, similar to the way they do in electric guitars. To avoid deformation of the top at the end of the extension (where the downward pressure of the neck is greatest) a carbon fibre rod brings the tension to the bottom of the neck block. To avoid the neck block from tilting because of this, 2 more rods are glued from the top of the neck block to the waist of the guitar, arguably the stiffest point of the body, with extra support from one of the back braces **photos 5, 6**.

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The necks are attached with a Norelem positioning cylinder **photos 7, 8**. A titanium insert was especially made to hold the cylinder in place in the neck block **photo 9**. It fixes the neck by

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pushing outward three hardened steel balls into a receiver bushing mounted flush with the neck **photos 10, 11**.

The balls of the positioning cylinder are pushed outward by turning an allen screw. I designed this setup so that the allen screw is reached from the back of the guitar. ¾ of a turn makes it tight enough to be able to withstand a force of 300 kg (over 660 LBS).

The receiver bushing in the neck and the case/cartridge in the neck block have to be aligned very precisely for the system to work. To achieve this a helping tool was made **photo 12**. Here's how it works: with the neck in place I drilled a 25 mm hole (1") through the neck and insert into the neck block. The helping tools' smallest diameter fits this hole exactly **photo 13**.

The template to rout the rebate for the receiver bushing fits the helping tools' larger diameter **photo 14**. Clamp template, remove helping tool **photo 15** and rout away **photos16-22**. Repeat these steps for the insert in the neck block and you get a fit with virtually no play.

To guide the allen wrench to the back of the positioning cylinder, a Dunlop strap lock (the flush type) is mounted in the back of the guitar **photo 17**. As mentioned, ¾ of a turn is enough to tighten the neck to the body. With the neck in place, the strap lock can be used for what it's made for: to hold a strap.

The bridge and tailpiece

Assembly and disassembly would take too long, and all of the strings would have to be taken off each time. So I opted for a tailpiece, which itself is attached to the bridge with 3 allen bolts, holding all 6 strings at the bridge **photos 18, 19**. This way, you only need to


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loosen the strings a couple of turns and the tailpiece can be removed. For efficiency, the allen screws have the same size as the one used to fix the neck.

The allen bolts do not screw into the bridge itself because in the long run that might damage the wood. Instead, the holes go right through the


18

bridge and top, and into a 3 mm (1/8”) thread in a small piece of metal I glued to the bridge plate.

Side reinforcement and extra sound hole


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Many of us provide our guitars with an extra sound hole in the side these days. My experience, on my own guitars and those of others, is that the sound seems to come around the guitar more, and they loosen up the basses a bit. You may pay for that with a little less projection, but there are


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excellent amplification systems these days to solve that, especially for steel string guitars.

I do not have enough experience with the extra sound hole to say anything definitive about their optimum position or size. My careful first conclusions are that even a small hole will help the guitarist to better hear himself play. Too large a hole seems detrimental to the sound: it becomes thin and weak.


22

Before I put the hole in, I used glass fibre mat and epoxy resin to reinforce the side **photo 20**. Then the hole was cut out with a fret saw, not for cutting fret slots, but the one we all used in elementary school, and cleaned up using a Dremel.

The glass fibre mat runs right


Finished double neck


Close-up

down to the lower bout, making the side stiff enough to mount a pre-amp.

If you're thinking about using glass fibre, make sure that on the mat you glue your kerfed linings with epoxy. Regular wood glue won't stick properly.

Electronics for the ambidextrous

The electronics were designed by the excellent electronics engineer Barny Pronk. There's an AER piëzo pickup under each saddle, with a balance pot in the lower bout. Mounted to a goose neck inside the body is a Shure condenser mike which has a separate XLR output **photos 21, 22**. Plug in a mono cord and the balance put is just what it is: a balance pot between the piëzo's. plug in a stereo cord and both piëzos have their own channel. But now, when turning the pot, they switch channels. So when you have an effects processor on one of the neck's signals, you can switch that effect to the other neck by turning the pot. A nice feature for the ambidextrous among us.


Fixing the neck

Conclusion

It turned out to be a balanced guitar bass/treble wise. The sound of both necks is well balanced too, but they sound subtly different. This works well for playing chords and solos, or bass lines and melodies at the same time.


Fixing the bridge


Fitting the necks

The tailpiece and neck are fixed with the same allen wrench, making assembly and disassembly is a piece of cake. You only need a couple of turns from the tuners to give the strings enough slack, so with a bit of practice it can be done in 5 minutes.

Most importantly, Terence is happy with his new guitar. "This guitar exceeds my expectations in many ways. From the tone, to the appearance, and the travelling take apart design. I feel that it allows me more expression as an artist, and a dynamic response I could have only dreamed of!"

Mission accomplished!

On my internet site you will find a slide show of the more general building process as well as a live track by Terence Hansen.


Tightening the 2nd neck

Guitar in case

Relevant links:
www.heeresguitars.nl
Photos by RH, except:
Photos * Maarten Fleskens (http://www.hangar36.nl/pixel8.html)
Photos** GitaarPlus Magazine
www.norelem.de
Barny Pronk can be reached at +31 (0)70 3648357

Richard Heeres (The Hague, The Netherlands, 1967) was trained as a cabinet maker and mechanical engineer. He started making guitars in 1992, after taking a course from David Freeman in Tugaske, Sasketchewan. He started out building steel string guitars and the occasional electric, but has since specialized in flamenco guitars and archtops. □

Richard Heeres & Terrance Hansen

When there is e-mail or "snail mail" that comes for Guitarmaker.org it will be listed here. Look for contact us and leave a message.

Dear Guitarmaker,

What ASIA means to me:

I joined ASIA way back in 2000. I have been an active member since. I have been to 3 symposiums. In 2003, 2005 in Westminster, MD. These were under Rick Davis and I found them to be so much fun. As a green horn luthier, I learned so much. Not just at the presentations, but at the after hours dorm get togethers. 2009 was at East Stroudsburg PA and was presided over by Bear Acker. A heart felt thanks goes out to Bear, Tina, Dave and Nadine Nichols. This takes more work than we realize. To pull off such a great program took dedication. Thank you all.

After the day's festivities we would gather outside the dorms, play, talk, and socialize. I met many good people here and many to this day are still my friends. I look forward to each symposium. At these outings I learned much about business, customer issues, supply and production. It was great to learn from people that are "in the know". It is a great way to share information.

During these first two festivities, mentors like Steve Kovacik, David LaPlante, Rick Davis, Rich Alteri, Bob Cefalu, and Danny Brown helped steer me. My success is because of what I learned at ASIA and from the mentors, that led to me joining. This is my way of giving back. Thanks for allowing me the honor of being a presenter at this year symposium.

To Dave Nichols and Nadine of Custom Pearl Inlay, Lee Mulverhill, Keif and Tracy, thanks for sharing your time and knowledge.

I asked the three people that to me are the heart and soul of ASIA the same 10 questions. The responses are in my article in this Guitarmaker. I hope you enjoy learning what these men have to offer. To Dick Boak, thanks for the early guidance and help that you offered. To Dave Nichols, thank you for the knowledge of inlay process you gave me, and the time you still share. And Grit, thanks for the presentation and sharing of information. You three men have helped so many and touched a lot of lives. Your friendship and respect are not taken for granted.

Thank you
John Hall
Blues Creek Guitars

Continued on page 25