# CUSTOM CRAFT

LONDONGUITAR SHOW 2006

## WELCOME TO THE SECOND INSTALMENT OF OUR FANTASTIC ORGANIC GUITARS COMPETITION WHERE WE GET BUSY WITH CONSTRUCTION. YOU CAN WIN THE GUITAR AT THE LONDON GUITAR SHOW IN MAY, SO EYES DOWN FOR A CLOSER LOOK

**For many of us, that one-of-a-kind custom guitar will remain little more than a dream. Finding the spare grand or three to fund that dream is never easy in the cold, financial light of day. Besides, a guitar's a guitar, isn't it? You don't *need* a custom-built instrument, do you?**

Oh but, of course, you do. And we're here to help fulfil that dream.

The CNC machine goes to work on the guitar's curves

For those of you who missed last month's feature, let's recap. Duncan Wales, boss of Peterborough-based Organic Guitars has offered up the prize of an exquisite custom guitar, that one lucky London Guitar Show attendee will be taking home with them. Rather than leave it at that, *GB* is following the guitar's production from the very beginning; last issue we saw Duncan choosing his woods and cutting the blanks, next issue we'll see the fretting and finishing, along with a review of the final product. This month, we'll be taking a look at the machining processes and techniques that our Duncan employs to build the – indeed potentially *your* – perfect custom guitar, and witnessing the use of some particularly clever technological advances.

### THE UTTER CAD

If there's one thing that Organic guitars takes a pride in, it's – as Duncan puts it – "combining traditional skills with modern technology for the best possible product." Having watched him hitting pieces of wood with a hammer to test resonance, one might expect the guitar's construction to involve handsaws, wood glue and a lot of sandpaper. Not so. In fact, when any of the Organic range is first designed, there's not a piece of wood in sight – not even a pencil and paper. Using highly advanced 3D CAD software (that'll be computer aided design, then – boffin Ed), a virtual model of the guitar-to-be is created. Using this, Duncan is able to adjust

**"WE COMBINE TRADITIONAL SKILLS WITH MODERN TECHNOLOGY FOR THE BEST POSSIBLE PRODUCT"**

1 The CNC makes short work of the through-string holes

2 The finished body...

3 ...which Duncan then separates from the excess wood, held on by tabs

4 (Overleaf) The neck and body await joining

5 The fingerboard sits unglued on the neck, awaiting frets and inlays, which we'll look at in next month's issue

measurements, apply textures to determine the guitars aesthetics, and even – astonishingly – predict which areas of the body and neck will come under higher levels of tension (see Loads Of Fun boxout, below).

As if that wasn't enough, the software then sends the measurements and templates direct to the CNC machine, ensuring that every cut into the wood is perfect. "Some people see it as a gimmick. They would argue that Stradivarius didn't need things like this to build his violins," says Duncan. "But I say, 'If you have the technology available, why the hell wouldn't you use it?' You may as well argue we should all still be living in caves!"

## CLASS ASSEMBLY

Using the aforementioned measurements provided by the software. The "fully 3D, smart plus CNC" machine is able to cut a control cavity into the body with pinpoint accuracy. The front and back are cut in to separately, the machine making adjustments to ensure that both sides match up perfectly. Look closely at the body cut out from it's block over the page, and, as well as admiring the figuring and grain of this guitar, on the left-behind template you'll see little wooden 'tabs'. These are there to hold the body in place during the cutting process, and are subsequently sawn off when its purpose is served. It's not all mechanical assembly though, as Duncan explains.

■ Cutting complete, Duncan unscrews the wood from its base

"SOME PEOPLE THINK CNC MEANS YOU PUT IN A BLOCK OF WOOD, AND 30 SECONDS LATER: PERFECT GUITAR"

"Some people think CNC means you put in a block of wood, and 30 seconds later you have a perfect guitar. Geometrically it's all there, but the shaping is pretty rough. The process leaves machining marks and 'woolly' edges – especially when cutting across the grain – that need to be properly filed out". A microplane, a tool consisting of multiple tiny planes, is applied to smooth everything down properly. With this done and the control cavity cut, the body is finished, at least in terms of machining.

## JOINT EFFORT

The neck joint is a particularly important part of the construction process, and affects both the structural integrity and natural sustain of any guitar. Last month, Duncan showed us that his designs plumped for maximum wood-on-wood contact. With both the body and neck parts of the joint measured up and cut, all that remains is to put the two pieces together; not as easy as it looks.

■ The tabs around the block outline keep the guitar firmly in place, and are then cut off

There are a great deal of differing opinions concerning what is the 'best' joint, but one attribute that everyone can agree on is 'the less glue involved, the better'. Luckily for any Organic guitar owner, Duncan is quick to point out quite how little glue is needed for his models.

"It's a snug fit into the body cavity; it doesn't need a hammer blow, but it takes a firm push to actually get it in. Just as a test, I've strung up guitars and tuned them to pitch, with simply the two pieces of wood [and not even a trace of glue] bearing the tension."

Once the neck is pushed in, a 'feeler gauge' is used all around the exposed joints to search for gaps. If the tool (measuring only five 100ths of a millimetre) is able to find its way in, then Duncan isn't happy. Gaps mean that something isn't quite straight, so the joint is unable to sit exactly right in its pocket. Applying chalk to the body joint and pressing in and then removing the neck, he's able to see which areas are making contact and which aren't. A chalkless patch means that things aren't as they should be, and so he'll go to work with a chisel to amend the situation. Once things are absolutely perfect, the neck can be properly set, but in this workshop, even the glue is extraordinary.

"It's aliphatic resin glue, and it's very, very strong. If you glue two pieces of wood together with it and break it over your knee, you'll break the wood elsewhere before you

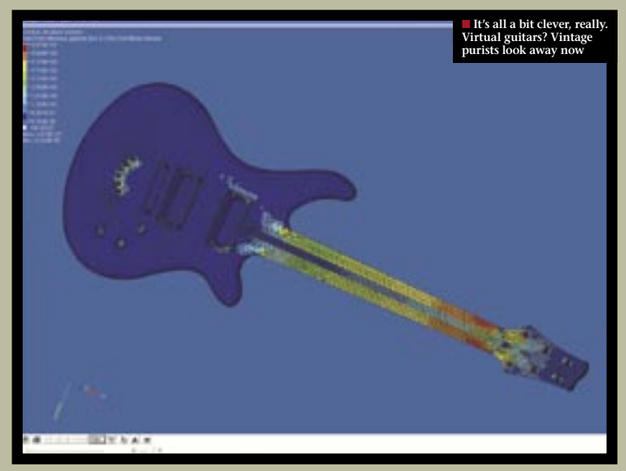
# LOADS OF FUN

## TECHNOLOGY VS TENSION

■ **Even though guitars are the result of incredible craftsmanship and jaw-dropping human skills, every guitar builder can benefit from using technology to take care of certain processes. Even the most techno-savvy among you, however, might well be shocked with what Duncan gets up to in his workshop...**

The picture to the right is a model of the guitar that will eventually belong to one of *Guitar Buyer*'s lucky readers. All the measurements and contours were entered into software by Duncan, and from these, an exact simulation of the guitar is created. But, and here's the clever bit, the guitar's physics are worked out too. Algorithms working inside the software can predict exact tensions across the wood of the guitar, and therefore pre-empt potential weaknesses.

Still following? Right: blue areas of the picture here are tension-free, moving through the spectrum to red, where the load is at its greatest. The aim, of course, is to get reasonably equal colours – and therefore equal tensions – across the length of the fingerboard. All this, without touching a pencil, let alone a piece of wood! Blimey!

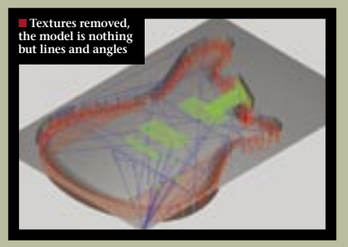


■ It's all a bit clever, really. Virtual guitars? Vintage purists look away now

■ The body shape in all it's non-real glory

The wonder of technology doesn't stop there, however. Using texture mapping, Duncan can cover the model in virtual finishes and graphical representations of the various woods and metals employed. Adjustments to both the measurements and aesthetics can be made in real-time, meaning easy design alterations and the otherwise-impossible benefit of chopping and changing parts and woods without any cost in materials.

It's another world to vintage-loving eyes, but we at *GB* are truly bowled over by Duncan's work.



■ Textures removed, the model is nothing but lines and angles


Duncan takes his microplane to the neck cavity, ensuring it's a perfect fit

"THE JOINT IS SO SNUG THAT BARELY ANY FORCE IS NEEDED TO HOLD IT IN PLACE"

break the join". Strong stuff indeed. A simple clamp holds the wood to the body, but the joint is so snug that barely any force is needed to hold it in place.

In terms of machining at least, the body and neck are finished. The blanks of wood have been chosen, prepared, cut and shaped, and all the major routing has been done. Using a great deal of design nous and technology at this stage all helps to ensure the instrument will sing when it's complete. So...

## NEXT MONTH

With the body and neck machined and shaped to perfection, and the guitar now set as one piece, our final instalment will see Duncan give the body a stunning finish, fret the fingerboard, install the collection of hardware you can see in the picture bottom right, and set up the guitar so it plays like a dream. We'll get our hands on it, too, and give it the full *GB* once-over before we let one of you lot take it off our hands. All it takes to win this beauty is of course a visit to *The London Guitar Show* 2006! You'd be mad to miss it! **GB**


Clamping the neck to the body, waiting for the glue to set


4


5


Hand-finishing the body to smooth the shape to perfection


This collection of hardware will be added next month

# WHAT'S IN IT & HOW TO WIN IT!

**There's just one feature left to run before the LGS! You simply can't afford to miss out on the chance of winning this beauty. Last month, Duncan told us all about the finished product. And to update those of you who may have missed last month's *Guitar Buyer*, here it is again...**

"This guitar is going to have fantastic sustain and a really resonant tone, with lots of overtones. The bridge will be a Schaller Nashville tune-o-matic style, with through-body stringing. There'll be the Bare Knuckle pickups, Schaller back-locking tuners and Schaller strap locks. There'll be a lot going on in the sound, but it will be a very organic – of course! – woody-sounding guitar. We've developed the pickups with Tim Mills from Bare Knuckle Pickups specifically for these guitars, and the brief that Tim was given was that we wanted to hear the guitars rather than the pickups, so I wanted them as transparent-sounding a pickup as possible."

Remember that in addition to the guitar, the prize will also include a hard-shell case, certificate of authenticity, Organic guitar strap and picks, and a specially engraved control plate inscribed with the winner's name and 'London Guitar Show 2006'.

### TO WIN THIS FABULOUS GUITAR, HERE'S WHAT YOU HAVE TO DO

The prize guitar will be on display at The London Guitar Show 2006 (5-6-7 May, Wembley Exhibition Centre). The competition will be offered ONLY AT THE SHOW, meaning only show visitors will be able to enter. So, simply fill out a form, available from Organic Guitars or the Guitar Buyer stand AT THE SHOW, and post it in one of the provided boxes. We will make the draw on Sunday afternoon at 4pm, and the lucky winner's phone will ring. Final part next month...

LONDONGUITAR SHOW 2006

### THE RULES

Entries accepted only at The London Guitar Show 2006. Entries must be completed in full and posted into a designated box no later than 3.45 on Sunday 7 May AT THE SHOW ONLY. The winner will be picked at random and will be notified immediately. If the winner is at the show, they can collect the guitar from Organic Guitars stand at The London Guitar Show. Employees of MB Media or Organic Guitars may not enter. There is no cash alternative, the editor's decision is final and no correspondence will be entered into. No multiple entries.