THE ARTIST & THE AXE

REDESIGNING THE RELATIONSHIP BETWEEN THE GUITARIST AND THE GUITAR

INTRODUCTION
I'd never claim to be a professional luthier, or even an amateur. Not yet at least. A gearhead at best, perhaps. But at the core of this two-quarter project on guitar design is a homegrown passion for the beauty and power of the solid body electric guitar. Two quarters ago, this passion was muddled, unclear. But as my research delved deeper into the past to draw conclusions for the present, it became increasingly, frighteningly real. It is undeniable now, I think, that I am a product of the electric legacy, a child of generations of axe-slinging rock stars, mournful Blues masters, Jazz riffing moguls, even Metal mavens. Alongside the masses of electric guitarists around the world, I love the idea of playing the instruments they played and sounding the way they sounded, but in my design mind I saw a place for improvement in the way the player interacted with the instrument. Just as the greatest guitarists gave their best to the rich history of the instrument they loved, I set out to find a place to contribute my own, tiny, meager offering: research into improving the physical relationship between the guitarist and the guitar.

In the history of music, few instruments have had as dramatic an impact on popular music and culture as the electric guitar. Now a staple of musicians performing and recording worldwide, the electric guitar has proved its worth as an instrument flexible enough to span dozens of genres and influential enough to inspire waves of young musicians to follow in the footsteps of their axe-slinging heroes. This cult following of musicians pursuing the sounds and instrumentation of the legends, however, has built a backward-looking industry of guitar technology desperately seeking the past while fiercely resisting change. As a result, many of the most famous guitars have remained largely unchanged from their introduction to the market to the present, with some modern models actually identical to their ancestors down to the most exacting specifications. Unfortunately, these older styles are often uncomfortable or physically taxing to play, especially while seated.

Due to design flaws and poorly configured control rigs, control knobs and switches are difficult to reach or too easy to accidentally adjust while playing, and instrument shapes do not conform comfortably to the human body. In this research, we will seriously consider the ergonomics of current instruments in respect to non-musical physical relationships, which are here defined specifically as the player's interaction with the guitar controls and the body itself. While the intention of the research is not to completely reject the rich history of electric guitars and move toward a more ergonomic solution, the research is meant to develop ideas to improve player comfort and control accessibility without sacrificing aesthetics or tone.

The most natural starting point was an examination of the most widely available guitars. The major stakeholders in the electric guitar market are the Fender/Squier Stratocaster and Telecaster, which are in direct competition with the Gibson/Epiphone Les Paul and SG models. These instruments have enjoyed a dominant market share since their introduction in the 1950's and 60's, and while there have been spawns of original models from various guitar manufacturers, these four designs are by far the most commonly imitated by competing brands.

Unfortunately, the age and sentimental value of these designs yield a double-edged sword of outdated design methodology and a relentless intolerance for change. While these designs were introduced upwards of fifty years ago, the amount of change each of these designs has undergone is nearly minimal, and although material quality and workmanship have varied slightly since then, design difficulties, such as unwieldy control configurations and uncomfortable body shape, remain almost perfectly preserved from their inception.

Having established the four major stakeholders in the industry, the next logical step was to contact guitarists and ask their opinions on general guitar design, as well as specific complaints toward the aforementioned models.

Responses showed a generally reluctant acceptance of instrument design, but a significant number of guitarists mentioned the desire for a more useable control rig, illustrated by the following quotes:

> *Pickup switches are a huge problem for me; I seem to bump them no matter where they are placed, since they are often toggle switches that stick out like a sore thumb.*
>
> *The original configuration was confusing as to which set of knobs went with (each) pickup, and I was frequently adjusting the wrong knob.*

The guitarists were then asked to be recorded in a brief video that would capture them playing in the various styles they were most comfortable with; one clip each for standing and seated playing. All told, Jazz, Blues, Rock, Funk, and Indie styles were covered, using an assortment of Stratocasters, Telecasters, as well as a Gibson imitation hollowbody.

Using these clips, tracing masks were created to identify areas of the guitar that the pick or picking fingers came in contact with (below, yellow), as well as the area of movement of the bottom knuckle, which is the most likely to knock controls out of place (below, pink).

Examining existing instruments that are "pre-worn" for a vintage effect also indicates common difficulty areas for guitarists. The scratches, dents, and dings artificially manufactured to resemble a broken-in guitar lend insight to where the most common strumming and general wear marks are, and are also a powerful testament to the semi-engineered, semi-emotional relationship between the guitarist and the instrument itself.

"Look at this beautiful wear. It has personality. This guitar has a story to tell."

In addition to the study of guitar control rigs, the video clips also allow the study of the most common contact points between the instrument and the player, and an investigation of whether there may be need for consideration in those areas when designing a guitar. Feedback like the quote below indicate that there are, in fact, areas of the guitar that could benefit from change.

[The Telecaster] is not a very well curved body, and the edges are square... It can be uncomfortable if you rest your arm over the top, for instance.

In these videos, carefully studying the way that the player interacted with the actual body of the instrument, such as contact points on the bottom edge and the area the arm drapes over the guitar, indicated challenge areas that were measured for angles and contact.

Based on the traces recorded in the research, it became apparent that in multiple cases, the control rig is either directly or very nearly in the way of the player's strumming. In order to analyze the findings as a more objective measure, we can overlay the tracings in reference to the bridge saddles to create an idea of where the most likely contact or control obstruction points are on the body of the instrument.

Additionally, observing the common contact points in an analytical manner, checking points of contact and the angle the human body interacts with the guitar body give indicators to where the most important points of improvement in terms of comfort.

The most basic application of this research is to provide a more established manner to create truly customized, highly personalized guitars tailored to individual players and playing styles, since the research demonstrates a way to more empirically observe guitarists while they are playing.

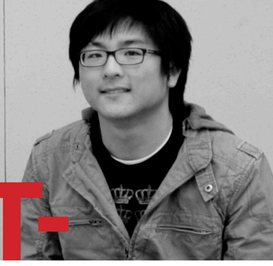
Ideally, however, this research will give DIY guitar makers or less tradition bound, change-welcoming instrument manufacturers a basis for improving the hallowed electric guitar designs of old, and also provide similarly forward thinking guitarists with instruments that are more comfortable and useable without rejecting the rich tradition of the electric guitar.

"Pickup switches are a huge problem for me; I seem to find a way to bump them no matter where they are placed."

Video Tracing Mask

Standard Telecaster Control Rig

ELECTRIC GUITAR + DESIGN



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