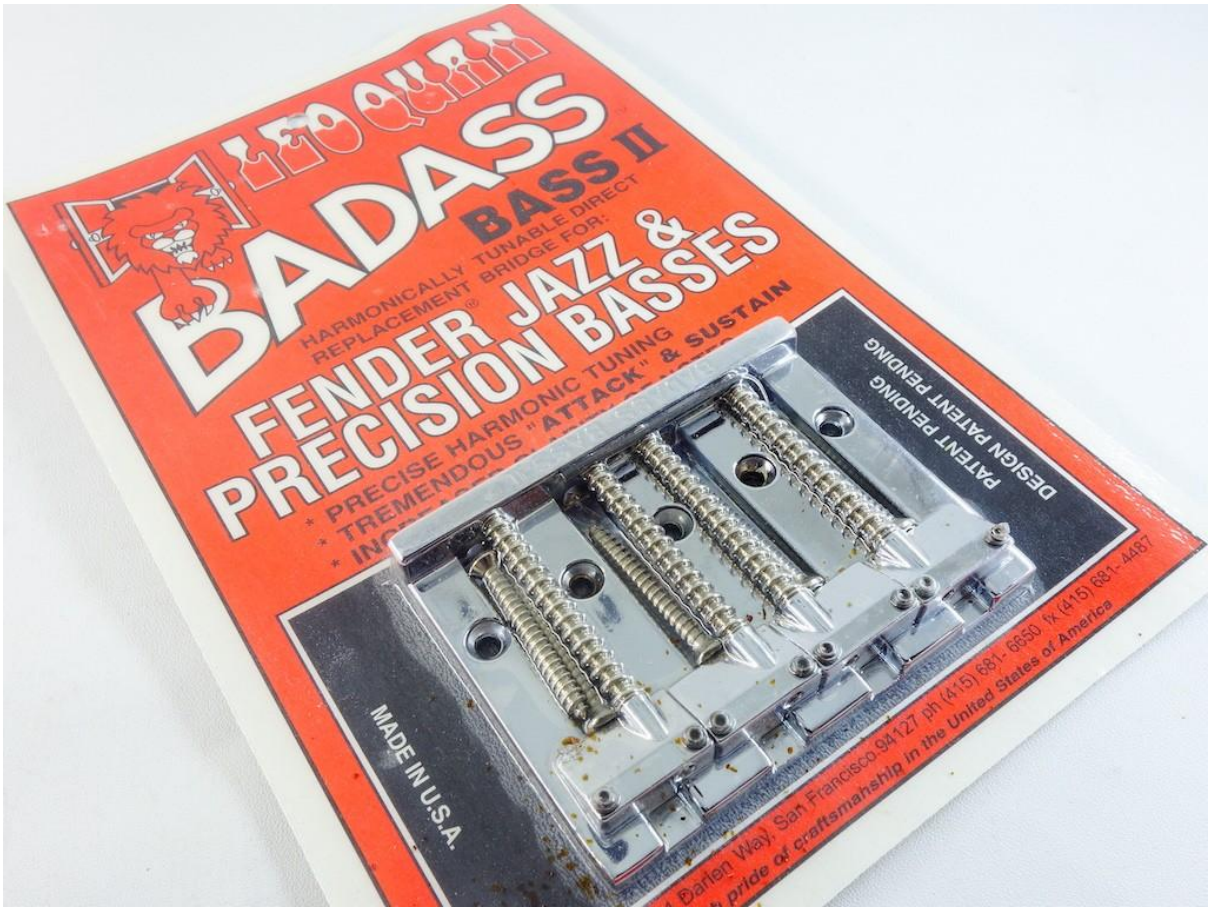
A Bridge Too Far?



This is a semi-technical article aimed at those of you who are musicians. I'm telling you this now so that you don't moan at me for having wasted some of your Sunday afternoon reading it. I'm sure you have more important things to think about ie:- your neighbour's new curtains or what Kim Kardashian had for breakfast.

Still here? OK… as it's pissing down with rain and I'm unable to spend the afternoon shooting nitrocellulose lacquer all over my guitar, myself, the cat and anything else within 10 metres I've decided to share my thoughts on a subject that has been concerning me lately. You may have noticed that some guitar manufacturers are building their instruments with 'high-mass bridges', and making a big thing about it: *"Increase sustain today with our super-heavy TungstenTech™ bridge - your notes will sustain for days and you'll instantly gain the respect and admiration of your fellow*

musicians". The guitar parts aftermarket is full of these devices also. Sounds good. We all need a bridge with the mass of a small neutron star then, to improve the sound of our guitars… don't we? Bass players who have fitted a BadAss bridge to their Precisions or whatever seem to rave about them. But has the sound of the guitar been improved, or has the increase in sustain (which is undoubtedly real) blinded them to what is really going on?

Consider the science behind all this: When you pluck a string, you are imparting energy into the string, causing it to vibrate at a particular frequency which is dependant on the mass of the string, its length and its tension. This energy is then transferred into whatever the string is attached to… the bridge and string nut, and then into the body and neck of the instrument. This energy causes the body and neck to sympathetically resonate. The way in which the wood vibrates and the harmonic frequencies it produces are dependant on its physical makeup, which is why a Gibson Les Paul (made from mahogany) sounds fundamentally different from a Fender Stratocaster (made from ash or alder). Different woods have different natural harmonic resonant frequencies. This is also why middle C played on a piano sounds different from middle C played on a trombone. Same frequency but different sound, or timbre, or range of harmonic overtones and undertones due to the different materials used in the instrument's construction, which makes every instrument sound unique. With guitars, these resonant 'signatures' are then passed back into the string, causing it to vibrate in sympathy with the wood. These 'harmonically modified' vibrations are then detected by the guitar's pickup. The pickup on an electric guitar or bass is essentially a permanent magnet that is wrapped with several thousand coils of very thin (usually copper) wire. The strings sit within the magnetic field and, when moved, cause the magnetic field to change shape. This rather conveniently produces an electric current within the coil of wire which can then be amplified to drive a transducer (loudspeaker). This may all sound very obvious, but how does the mass of the bridge affect all this?

A high-mass bridge will have more inertia, or resistance to movement, than the more traditional 'bent piece of steel' that you'll find on vintage guitars. When the energy that you have put into the string reaches this mass, the mass will say "piss off, I'm 100 times more massive than you and I'm not going to move" and the energy will be 'bounced' back to where it came from - back into the string. This is why you get an increase in sustain… the energy is staying within the string rather than being

transferred into the body, causing the string to vibrate for longer whilst it dissipates the energy in the form of pressure waves in the surrounding air and heat. The mass of the bridge will, of course, only resist movement for a while (which would be quantifiable by cleverer people than me who are into physics) and will eventually fall into line with what's going on around it… but by then you may have moved on to the next note, and the resonant frequencies of the wood will have been lost.

Clearly there is an optimum solution to all this which will depend on the type of music you play and it will, like most things in life, be a compromise between two mutually exclusive extremes… if sustain is a priority for you, fit a high-mass bridge. If tone is more important to you, consider sticking with the stock bridge and increasing sustain (if that's what you want) by using a compressor. Not everybody wants to increase sustain, though… as a bass player I spend most of my time muting notes and trying to kill any sustain, so I'm happy to use a relatively lightweight bridge and enjoy the improved tone that I get from doing so.

One thing's for sure: manufacturers will (if they want to stay in business) make what the customer wants, even if the customer's reasons for wanting a particular product are misguided. Think on…

Next week I'll be talking about why mowing your lawn is causing the Polar ice caps to melt, and why wearing silk underwear can decrease your carbon footprint.