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MATERIALS AND ACOUSTICS: A GUITAR MAKER'S VIEW

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ABSTRACT

With the craft and art of instrument making being passed from one generation to the next, mainly through an apprenticeship system, the maker's approach to his work has a practical bias. His understanding of acoustics is developed through a thorough knowledge of and familiarity with the materials he uses, which is a long process.

DISCUSSION

Tradition still determines the choice of wood and, to a lesser extent, the dimensions of the modern classical guitar. The size of today's instruments remains much the same as that developed by Antonio Torres 130 years ago. These instruments are commonly used as a model by makers today.

The choice of woods used in the classical guitar is determined by two main factors: acoustical properties of individual species and tradition. The two are not always compatible.

Tradition has had an extremely powerful influence, sometimes at the expense of acoustical considerations. Not only does this influence have commercial connotations, but the tone and character of sound that modern guitarists demand is conditioned to some extent by the work of the old masters, whether players or makers, and is commonly quoted as the ideal by leading guitarists today.

This same conservatism is common amongst guitar makers. The choice of woods, dimensions and design has passed from master to apprentice and has always looked back to old masters for inspiration. Equally, working properties of certain woods are not, as in many industries, an important criterion of suitability. This is partly because there are often more important requirements and also because a considerable amount of work is done by hand, and it is possible to devote the necessary time to dealing with a different timber.

On the whole, makers are able to use traditional, or very similar woods, for the more important parts of the instrument, and there has been little reason to experiment with other species. Consequently, it has often been difficult to ascertain exactly what properties are required for a given purpose, because the reasons for choice of species lay in the results of the trials and errors of previous generations of craftsmen.

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The increase in demand of the last twenty years for the classical guitar has coincided with a severe shortage of some of the most important species used in its construction. With the urgent need to search for alternative species, and a wish to use woods resembling as closely as possible the traditional woods, fresh enthusiasm is slowly developing amongst a new breed of guitar makers to understand the acoustical value of the traditional species.

Inherited also from previous generations is the method of selection from the appropriate species. The system of cutting, grain direction, spacing of annual rings, feel, flexibility, and the maker's own experience and inherited skills will determine the choice of a particular piece of wood for each of the individual sections and their acoustic requirements.

As well as the choice of wood, the method of construction influences the sound of each instrument. The pattern of support barring and bracing of the soundboard is perhaps the most important element within the guitar directly under the control of the maker by which he can adjust and modify the instrument's tonal characteristics.

Continuing with the construction of the sound chamber, the choice of wood for the sides and back has again been determined by history. Unlike the species used for soundboards, which have had at least 400 years usage, rosewood came into common use at the beginning of the 19th Century. From then on Brazilian rosewood (Dalbergia nigra) became the favoured wood for the back and sides of the best classical guitars. As supplies have become increasingly more scarce, Indian rosewood (Dalbergia latifolia) has been substituted.

The hard and brittle characteristics of Brazilian rosewood produce, through its reflective capacity, a clear, bright and penetrating sound. It is this charateristic that has appealed so much to guitarists. The substitute, East Indian rosewood, has similar qualities, but whilst fulfilling this role admirably, its use should not prevent research into the properties of other species.

Recent research undertaken by myself into alternative species for this purpose has shown that a number of other timbers can give excellent results. Some produced results somewhat different and unfamiliar, but perhaps with time these new woods will be judged on their acoustic and tonal merit and not compared solely with the more familiar rosewood.

Any development in the classical guitar, whether in acoustics or materials, or a combination of the two, is at the moment restricted by tradition and the conservatism of makers and musicians alike.

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The pace and value of future developments will depend largely on makers adopting an open-minded approach to the instrument and musicians accepting new tonal possibilities. The contribution to this development by science might be its ability to penetrate the natural resistance of this very tradition-orientated profession.

The intense competition of recent years amongst the bourgeioning school of guitar makers, as well as the more established workshops, has encouraged some interesting developments. A large proportion of this work can be assumed to be for commercial advantage and therefore of superficial merit. But, out of this burst of creative activity may come developments of lasting and constructive value.