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# Influence of tonewood parameters on the perceived sound quality of a steel-string acoustic guitar

Sebastian MERCHEL[1]; David OLSON[2]; M. Ercan ALTINSOY[3]

(1) TU Dresden, Germany, sebastian.merchel@tu-dresden.de
(2) Pacific Rim Tonewoods, USA, d.olson@pacificrimtonewoods.com
(3) TU Dresden, Germany, ercan.altinsoy@tu-dresden.de

## Abstract

Wood is one of the preferred materials for building stringed music instruments. Because wood is a naturally grown resource, there is large variability regarding material properties, even within species. Therefore, luthiers select their tonewoods very carefully. In this project, listening tests were performed to investigate whether the objective testing of physical parameters of the tonewood can help to make an appreciable and reproducible impact on the sonic quality of the resulting instrument. Nine steel string guitars of the same model were produced by the Taylor Guitar Company, with strict control of all production parameters. The guitars varied only in two parameters: the density and the modulus of elasticity of the soundboard and bracewood, both made of Sitka spruce. The variability was representative of the range of the spruce wood currently produced by Pacific Rim Tonewoods, a supplier of tonewood to the acoustic guitar market. A short music sequence was used for pairwise preference evaluation in a double-blind listening test. The results suggest that, for this particular model (the Taylor 814ce Grand Auditorium), low density and stiffness of the guitar top have a positive impact on the overall preference of the instruments. More generally, the results underscore the importance of integrating the design with physical characteristics of the component wood.