



Feasibility study of computational environment for assisting musical instrument manufacturing

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Abstract

The musical instruments manufacturing requires several project demands related to the instrument structural capacity and to the desired aesthetic and sound attributes. Although technologies to support these projects have been available for at least two decades, most of what has been done is the empirical reproduction of consolidated models, which hinders innovations since it is often based on trial and error methods. Computational tools, therefore, are useful because they may provide a certain prediction level of the instrument structural behavior and its sound, leading to time and costs reduction in the instrument project. In this context, the Urutau project is emerging as a computational environment for assisting musical instrument manufacturers. This work presents a preliminary architecture of the Urutau environment as well as an objective validation study of its simulation tools. Initially, a simplified monochord is built and its corresponding CAD model is obtained. A finite element modal analysis is then performed and results are compared with experimental data. A physical modelling based on a modal approach is applied to generate a set of monochord synthesized sounds which are compared objectively to captured real sounds.

Keywords: Sound synthesis, virtual prototyping, physical modelling