Comparison of clarinet making over time - Seeking correlations between the player's perception - intonation, timbre, response - and objective measurements

R. Caussé[a], V. Rosi[a] and M. Jousserand[b]

[a]Ircam UMR STMS & UPMC, 1 place Igor Stravinsky, 75004 Paris, France

[b]Buffet Group, 5 rue Maurice Berteaux, 78711 Mantes-La-Ville, France

rene.causse@ircam.fr

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As part of ANR project CAGIMA, a set of six clarinets was selected, consisting of instruments made between the end of the 18th century and today (including a german-style clarinet), as an illustration of some of the evolutions of the making. The following measures have been realized: resonant frequencies of all fingerings (mouthpiece replaced with some equivalent volume), high precision mapping for the bore and the tone holes from a 3D digitalization of the moldings. Using resonance modeling softwares, and by computing the input impedance based on the geometry, some relations have been deduced between this geometry, the intonation, the inharmonicity, and the resonant frequency quality factors. Performance tests have been made on these instruments with professional clarinet players. The measure of performance parameters using instrumented mouthpieces allows to establish correlations between the musician's perception and the qualities and flaws of the instruments.