Wood density holds key to Stradivarius sweet sound

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By Ben Hirschler

LONDON (Reuters) - Researchers using a medical scanner have worked out why a Stradivarius violin sounds so good -- it is because of the remarkably even density of the wood.

For the past 300 years, musicians and scientists have puzzled over the unparalleled quality of classical Cremonese violins made by Italian masters like Antonio Stradivari and Giuseppe Guarneri del Gesu.

Now a Dutch doctor and a violin maker from Arkansas think they have cracked the mystery after comparing five classical and eight modern violins in a computed tomography (CT) scanner normally used to examine patients.

Using an adaptation of a computer program developed to calculate lung densities in people with emphysema, they were able to analyze the physical properties of violins without risking damage to instruments worth millions of dollars.

They found no significant differences between the median densities of the modern and the antique violins but did discover far less variation between wood grains of early and late growth in the old ones.

Since differentials in wood density affect vibration and therefore sound quality, the discovery may well explain the superiority of the Cremonese violins, they reported in the online journal PLoS ONE on Wednesday.

So why is the maple and spruce wood in a Stradivarius so different?

Part of the reason may be that trees grow slightly differently today than in the past.

"Climate difference could explain part of it but treatment of the wood could be another explanation. A third answer could simply be the ageing of the wood over the past 300 years," Dr Berend Stoel of the Leiden University Medical Center told Reuters.

"There is no way of knowing from this data; we've just shown there are density differences."

Still, Stoel and U.S. violin maker Terry Borman think the research may help modern instrument makers seeking to replicate the work of the Italian masters.

Their paper is available here