

Why Round and What's Lyrachord®?

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In 1965, Charlie Kaman, president of the Kaman Corp. and an avid guitar player, decided to produce the best guitars in the world. His company was uniquely suited to this undertaking, being one of the nation's foremost producers of rotor-wing aircraft and having top-level expertise and testing facilities related to the physics of vibration and acoustics.

The first task was to determine how various construction factors affect the sound of a guitar. In guitars, string vibrations are transmitted through the bridge to the top of the instrument which, together with the body, acts as a "sound pump" to generate air density variations within the body space. The quality and volume of the sounds produced are functions of the size and shape of the body and the materials of which it is made.

Kaman's engineers embarked upon their quest for a perfect guitar by analyzing virtually every guitar known. Modern and antique instruments were x-rayed, vibrated, measured, taken apart and reassembled. Audio oscillators were attached to the tops and readings of the vibration characteristics across the full tonal ranges were recorded. While some of the guitars had readings indicating that the "pump action" of the bodies produced fairly even volume up and down the scales, others had critically uneven response traits. Some even had nodal points or dead spots where no amount of energy input would cause the "pump" to work and there would be scarcely any sound projection at all.

After months of analysis, our engineering people had what was probably the largest collection of audio signatures or profiles ever assembled. Using them as the groundwork, they developed and tested more than 70 prototype designs over a period of eighteen months.

Finally, in mid-1966, the engineers had the answers they were looking for. The evidence they collected proved, beyond question, that the most efficient shape for a guitar was semi-parabolic, roundish, not unlike orchestra shells, ampitheatres, radar reflectors, and radiotelescopes. The tone that such a guitar shape produced from any given energy input was full, rich, deep, and constant from the bottom to the top of the instrument's range and even beyond the limits of human hearing. Sure enough, it was the ideal shape. Interestingly, the lute, the predecessor of the guitar, was round. Through the centuries the present conventional guitar shape evolved from the lute because it is easier to produce—not because it improves sound.



The next major problem was to find out how to construct a semi-parabolic guitar body. Wood would be extremely difficult, if not impossible, to shape to the new design, requiring use of internal bracing and reinforcing members that would dampen sound and create unwanted noises as in conventional guitars. Another drawback to the use of wood is that the wood would have to be very thin and fragile for the body to vibrate properly. The cellular structure and content of natural oils vary considerably, not only from one guitar to another, but even within a single instrument, making it very difficult to achieve constant vibrating characteristics. Considering that sound, like light, is best reflected by a smooth surface, unlike wood which is porous, it became apparent that a more suitable material should be found for the semi-parabolic guitar bodies.

The Ovation research team then made acoustical studies of many of the strong, lightweight materials they had created for use in aircraft rotors, fairings, radomes, missile nosecones, and other aerospace components that are subjected to high vibrational stresses. From that basis, they went on to develop and test many new materials until they created one that could be adjusted to the proper degree of resonance by chemical alteration and heat curing. They called this breakthrough Lyrachord®.

Lyrachord® can be precision molded, entirely free of bracing or reinforcement, to any shape and can be made as thin as desired for optimum vibration while remaining practically indestructible. It can't warp, chip, crack, check or split. A smooth, highly sound reflective surface makes it acoustically superior to wood, and its inorganic composition is homogeneous, assuring uniform vibrating traits throughout the tonal range of the instrument.

With the innovations of Ovation's round shape and Lyrachord® to produce it with, Mr. Kaman has indeed accomplished his goal of making the best guitars in the world; without a doubt, the Ovation Roundbacks represent the greatest improvements to come along in 400 years of the art of guitar construction. Don't take our word for it, though. Listen to an Ovation yourself, and let your ears testify to the difference that advanced aerospace technology has created.



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