TECH TALK

Franc Kuzma of Kuzma Ltd

Kuzma Ltd first began production in 1982. Founded by Franc Kuzma, it was inspired by his passion for music combined with a mechanical engineer's background and experience working on acoustic transducers, which fostered a desire to create high-quality playback from records. The initial product was a turntable with a straightforward design, featuring a classic belt drive and emphasising ease of use. It was named Stabi in recognition of its key strength—stability.

Meanwhile, work on the first tonearm was finished, and it was named Stogi, which, in Slovenian, is short for rigidity. Both products quickly took over the local market due to their performance and appearance.

Internationally, both Stabi and Stogi first appeared in the German and UK press in 1985, thus bringing the names Kuzma, Stabi, and Stogi to the attention of the audiophile community. The rest is history.

What is the key part of your design criteria?

In simplified terms, we follow Newton's Third Law of action and reaction when playing vinyl records. Let's ignore, in this simplified model, that the record must rotate and just focus on the cartridge body in the tonearm, which must follow the spiral groove. The needle is pushed along the record grooves. The cartridge's body needs to accurately capture needle movements to translate the exact information into a musical signal.

A stylus can read groove signals as small as just a few molecules. To accurately read small signals, the cartridge body should be 100% still—this is our zero-reference point. In theory, the needle should have zero mass, and the cartridge and tonearm should have infinite mass.

In practice, vibration is transmitted from the cartridge body and headshell to the tonearm tube. This means that the cartridge body is not entirely still, and as a result, the information from the grooves is not read with complete accuracy because our zero-reference point in the cartridge body moves—vibrating along with the tube. Our goal is to design the tonearm so that the cartridge body's zero-reference point remains as still as possible.

What influences the tonearm?

The tonearm itself receives vibrations from the turntable, acoustical feedback from loudspeakers, and vibrations created by the needle, the tonearm's bearing, and its own construction. To a lesser or greater extent, we listen to all our records with built-in coloration created by vibrating tubes in the region 500Hz-2kHz, which changes sound effects, stereo and 3D perspective, and smears focus and starting instrument attacks.

Due to its shape and construction, the tonearm's tube is very sensitive to vibrations. If you pick up the metal tube at one end and gently hit it with a metal stick, it will vibrate and be excited over a wide frequency spectrum, where the tube's own resonances occur. Thicker walls or different materials will have resonances in different frequency ranges.

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» As tonearm designers, we use various materials to create tubes, including aluminium, wood, carbon, steel, titanium, magnesium, or combinations. However, as we said earlier, they will all resonate within the range of 500Hz to 2kHz. We have conducted extensive research on vibration analysis of these materials in our lab.

My team and I often discuss ideas for improving our products, and some are wrong or impractical. However, we often still build a prototype just to learn and see what happens, like when we tested a rubber tube as a tonearm. It sounded very good— the tube has almost no resonances – but it flexes a lot!

Which brings us to Sapphire...

Yes! This was a 'eureka' moment. Sapphire is a very stiff, non-vibrant material regardless of its mass. So, we wanted to see what happens when we make such a tube and perform vibration analysis. We invested in samples of various sapphire tubes and took measurements. We learned that such tubes are inert up to 5kHz. We said 'wow', did a listening test, and concluded that every record owner should hear their records to understand how they can actually sound once you remove the colorations we are so used to.

Making a prototype is easy — it just needs to work. There's no need to worry about how it looks, how to assemble it, how to produce parts at reasonable costs, or how to service it. Will it survive customer use and adjustments? No need to think about packing, manuals, which accessories, or long-term reliability. For production, all these issues must be solved and finalised with all drawings.

What was your approach to designing the SAFIR models?

When we started developing SAFIR 9, there was a concern about the tonearm's high tube mass — specifically, the sapphire tube is heavy, and the effective mass will be in the range of 50-70g. We needed to reconsider what that means in practice. This level of effective mass is a no-go for certain cartridges or past theories. However, we had some experience with the Kuzma Air Line tonearm, which has a high effective mass in the horizontal plane and did not cause many issues when using suitable low-compliance cartridges. Additionally, in the past, radio stations used very heavy tonearms with good sonic results.

After SAFIR 9 was introduced, people started asking us when we would have a 12-inch version. Our reply was "just listen and enjoy the SAFIR 9!" But as we all know, we always have a quest to improve our audio systems so they sound at their best.

What problems did a 12" armtube cause

Initially, we thought, "Let's try making a longer tube first as a sample and see what the outcome will be with higher tube mass and lower tangential errors in tonearm geometry." However, it takes 6-9 months just to produce a sample tube. It took us a year to develop a proper prototype, conduct measurements, perform listening tests, and decide whether to proceed with the SAFIR 12 project.

As you know, we have the 4Point tonearm's VTA tower, which makes VTA/SRA adjustments very easy and repeatable. Nevertheless, out of pride, we decided to develop a new VTA adjustment system unique to the SAFIR 12, allowing it to be fitted on a 12-inch mounting distance. +

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