



Moving Iron vs. Moving Coil – why make the jump to a different technology??

A wise man once said, “The answer is contained in the question”. This implies that the quality of the answer is dependent on the quality of the question.

So ~ why make the jump to a different technology??

The list of answers to this question is long; long, but critical reading for those determined to get as much of the music information out of the grooves and into their ears as possible.

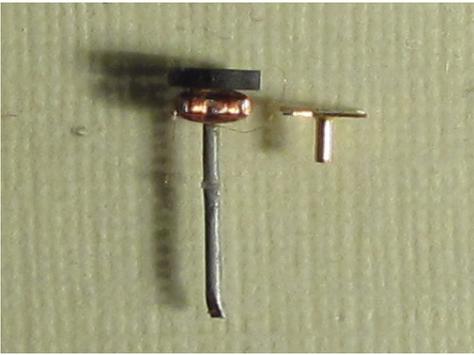
Most important first answer??

First and foremost, it is the “moving mass” – the generator inside the cartridge that must be moved at incredible speeds, stopped, and reversed in direction. Up to 20,000 times in one second.

Impossible you say? You are right. And no cartridge works perfectly as a result of the mass that must be moved; the problem is as simple as that - mass, and the laws of inertia. The degree of accuracy between cartridge technologies is just that - a matter of *degree* of accuracy - in large part determined by the moving mass of the system.

How does Soundsmith’s Moving Iron technology compare to MC in this extremely critical area? The answer is - it’s not a fair contest. Why??

We have at *least* 5 times less internal moving mass. The physics of this translates into 10 times better performance due to *lower stored energy* in “angular momentum” – the direction of the angular internal movement of the internal generating system of any magnetic cartridge.



Left is a MC armature, the right is our MI generator

Why is this “stored energy” (inertia) in the moving system so critical??? Good question.

The answer has two parts. One is the simple aspect of just getting the mass moving; moving this mass and then reversing its direction quickly as described above. A tough enough job. But once you get it moving, you “store” energy in this moving system, which is called inertia. The more mass, the more stored energy. The longer it takes to get it moving and the longer it takes to reverse its direction. You may ask – why else does this stored energy create a problem for performance?? The answer begins with asking – where does this stored energy go??

The answer is that phono cartridges are designed to transmit energy in one direction – from the groove, through the stylus and cantilever, and up to the generator parts to get them moving. And that works reasonably well for most cartridges – but better for ones with lower generator mass. But what of this “stored energy” – energy that must go somewhere to be dissipated??

The answer is: Some of this energy gets damped, but a very large amount of this energy reflects back **DOWN** the cantilever and into the stylus – ***which tries to put this energy into the record.***

Uh Oh. Houston – we have a problem.

Cartridges are not designed to put energy *INTO* a record. They are designed to receive energy from them when the record spins and moves the stylus. When they try to put energy back *INTO* the record, it doesn’t work at all, and as a result the stylus jumps horribly in the record groove – and does **NOT** stay in intimate contact with the groove walls. If your stylus won’t stay in contact, you cannot hear what is truly in the recording. You just hear the stylus “moving” – often not in coherence with what is recorded in the groove. It behaves like a tire on a bumpy road – it spends lots of time in the air – and **NOT** in contact with the road surface.

In this direction, it is technically called a “mechanical impedance mismatch” – lots of energy into a small mass, which cannot “move” the massive record groove.

If you lower the generator mass, less effort is required to move it, and less energy is stored by inertia, which results in far less energy reflecting **DOWN** the cantilever into the stylus. This means less **JITTER** of the stylus in the groove, because it has less energy that it is trying to put into the record. It’s *that* simple.

Another major benefit of less stored and reflected energy is better stylus control, which can be *directly measured* as superior channel separation. Soundsmith cartridges stand out from the entire crowd of MC designs as they often measure from the high 30's to the low 40's in terms of dB channel separation, compared to the 20's to 30's for MC designs. This is critically significant, as it is a direct measurement of stylus jitter !

Second most important answer ??

Much higher resonant frequency of the moving system inside the cartridge, and lower levels of it. What does that mean??

Everything has a resonant frequency. A bell. Your car. Your dog. Your friends.

The tire of a sports car – which by design, is supposed to return the road surface *QUICKLY* and without jittering or bouncing when a road bump “pops” the tire up into the air. How do they improve this?? They lower the mass of the tire and the rim. Basic physics.

The natural resonance of all these systems depend on how much mass they have, and how tightly they are “held”. MC cartridges have higher mass, and as a result of this and more stored energy, a lower resonant frequency, and higher amounts of it. These high levels of “resonating energies” cause the armature - the “moving coils” - to “wobble” or shake very violently when they are moved – like a bell when it is struck.

Smaller bell?? Higher note. Less violent wobbling when struck. Less violent energy reflected back down to the stylus, which as noted above, is not engineered to put energy into the record.

Our Moving Iron designs have much lower internal moving mass *for these two significant reasons – and many more.*

The combined effects of lower internal moving mass? Far less stylus “jitter”, which means far more time spent in intimate contact with the groove walls. More time in contact with the groove means more information retrieved from those little grooves. Music that is so much more revealing of what took place during the actual recording.

Far lower groove noise, or “hiss”. Lower Hiss? Why? Isn't groove noise or “hiss” caused by dragging a diamond through a plastic groove?

Interestingly, the answer is no. Hiss, or “groove noise” is caused by jitter – and the less violently the stylus jitters, and the higher the frequency of the jitter, less groove noise.

Translation? More fun for you. More music. More musicians with real sounding voices and instruments. More like “being there” than listening to a “record”.

Third answer?

Rebuild-ability. We stand behind our customers when they stand up for us. Imagine being told by your car dealership that because of a flat tire, *you need to buy a new car!*

A cartridge, like any part of your stereo system, should be a long term investment. And you should be able to get dividends from that investment. When it wears out, or breaks, it *should* be rebuild-able. After all, it is one of the most fragile and common wear-out items in a stereo system.

We rebuild all our models for 20% of their original cost. And we can do so many times. The “cost-per-play” goes way down. And the desire to purchase a higher performance Soundsmith cartridge goes way up. Our dealers, who are not used to cartridge manufacturers acting this way suddenly realize when the time comes and an unhappy customer faces them with a worn or broken Soundsmith cartridge - this is not a “lost sale”. *This is a grateful customer.* Grateful customers come back for more. And they send their friends.

Fourth answer??

Long term reliability.

Our internal suspension design is far, far more rugged than MC designs. Far more likely to survive an “accident”. Far more likely to stay in perfect alignment after long term use, or as happens all too often with cartridges, some accidental abuse.

Because they are longer lasting, they are far more likely to remain rebuild-able over many years.

Wire fatigue. What is that?? Everyone knows what happens when you bend a coat hanger wire back and forth a few times. The wire breaks. This is call “work hardening” in metallurgical terms.

The same thing happens in MC cartridges because by design, MC cartridges are just that – moving coil. That means the lead-out wires from the coils are constantly being bent back and forth as the coil moves or vibrates, work hardening the lead out wires. What happens when they crack and fail?? Dead Cartridge. Time to buy a new one.

Because our coils don’t move, our wires are fixed in place, and never fail. Better design – it’s that simple.

Fifth answer??

Advanced technology throughout our product lineup, and far more choices. When the industry stopped advancing cartridge design 35years ago, we did not. We kept going like vinyl was

going to always be enjoyed. We are glad we did that. You will be too.

Is there a LOWER moving mass of any cartridge design anywhere in the world, including all of Soundsmith's Moving Iron designs? You bet.

The Soundsmith award winning Strain Gauge designs. 80% less moving mass.

Soundsmith makes the largest variety of designs on the market. And the most advanced.

High, medium and low compliance, for any arm mass, from any vintage year.

High, medium, low and ultra-low (Low Z) output designs available for ANY preamp design in the world.

Mono cartridges? We make all our MI designs in true dual coil mono versions. All 25 of them. That's right. 25 models of Mono cartridges from Soundsmith. The widest variety of mono cartridges available anywhere.

Technologically superior cantilevers and styli. And tremendously advanced cantilever design, as in our Hyperion, which employs an organic material. Why?? Because you are expecting the best and most innovative results from Soundsmith – the very best you can get for your money.

One might ask the most painful question of all.

If Soundsmith has better technologies, why doesn't everyone else do it??

The simple fact is that long ago, when MC designs were developed, they *were* superior to *moving magnet*. But once you tool up to create one technology, and make many models within that technology, you can't simply switch to a radically different design. Even if you could, what would that say about all the years of making the "old" design??

This is not something Soundsmith has to worry about. We chose the tougher road, the harder cartridges to make, and the ones that are least understood, long, long ago. Why?

If you compare point by point, you will begin to understand that Soundsmith designs don't compete; to compete fairly, one must compare apples with apples. Our designs are sold by distributors and dealers, and purchased by faithful customers *because* our products are very, very different. We stand apart from the crowd for the best reasons, and for the best motivation.

Music.

Peter Ledermann/President – Chief Engineer