

Chapter 4: An Interview with Managing Director Per Lundahl, and the History of the Company

A White Paper from Lundahl Transformers
www.lundahl.se

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By Ken DeLoria

LUNDAHL
- TRANSFORMERS -

Lundahl Transformers is an extraordinary and unusual manufacturing company that originated in the basement of a house near the city of Stockholm in 1958. Founded by Lars Lundahl and his wife Gunnel some 55 years ago, the company has become a leader in the field of high-quality audio transformers. Lundahl products are used the world over in pro-audio and audiophile sound equipment, consistently garnering acclaim in applications that range from ribbon microphones, to preamps, to exotic audiophile vacuum tube amplifiers.

In 1940 at the age of 12, Lars Lundahl had already developed a keen interest in electronics. He was in the process of building his first radio receiver, but with World War II underway, electronic parts were difficult or impossible to find. Undaunted, young Lars developed workarounds that demanded unconventional ways of solving problems, and just two years later, he was working (part time, of course) as a repair person in a radio shop, receiving payment in the form of electrical components. This formative period, when inventiveness made up for parts availability, had great impact on the man who would spark an irreversible change in the transformer industry.

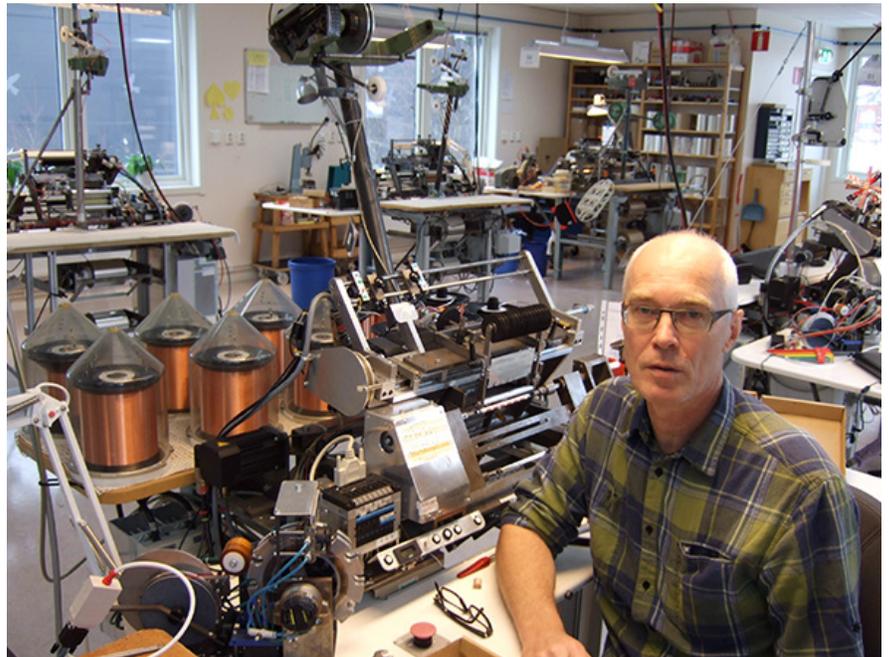
Fast forward to 1958. Lars now has an engineering degree under his belt, along with several years of professional experience. His theoretical and practical knowledge has made him acutely aware that most commercially available transformers, of that time, were of sub-optimal quality. Not one to mince words, “rubbish” was a term he freely used when describing market offerings of that era.

In response, he and Gunnel began their company in the basement of their home, literally building their lives around their passionate endeavor. As the company grew, the family eventually moved to Norrtälje, a small coastal town about 70 km north of Stockholm, in pursuit of quality of life away from the bustle of the big city.

Lars and Gunnel built a factory dedicated to manufacturing transformers, and a few years later, they added an apartment big enough for themselves and their four children. One of those children, Per Lundahl, is now the Managing Director of the present day company. The unusual approach of using a residential environment for a factory (or vice versa depending how you look at it) would prove to echo other unusual methods that the company would come to employ, in its mission to manufacture products that perform to the highest possible level.

As the business grew, extensions to the building were added as needed, including a third floor for additional manufacturing capacity. In the present day, a large commercial elevator provides access from the top floor to the bottom, while spiral staircases remain in place for practical usage, and as a nostalgic reminder of the company’s earlier years.

I met with Per Lundahl at company headquarters in Norrtälje, and was given an extensive tour of the facility, which was absolutely fascinating (see Chapter 3 to learn more). Nearly every machine used in the manufacturing process has been designed and built by the Lundahl staff. For example, the winding equipment that’s pivotal to manufacturing Lundahl transformers simply



Per Lundahl in his company's manufacturing facility.

cannot be purchased, so it must be designed and built by the company from the ground up. This unique manufacturing methodology is both the basis, and the key, to the superior sonic quality of the products.

During my visit, Per and I cloistered ourselves in a meeting room where he spoke thoughtfully and at length about how the company came into being, and what it represents to its worldwide customer base in today's marketplace. I found his knowledge of the electrical, mechanical, and magnetic properties of precision audio transformers to be profound.

Ken DeLoria: Would you elaborate further on your parents and the origins of the company?

Per Lundahl: My father was the "great inventor" (spoken wryly). Before starting the company, he worked for AGA in the development laboratory. AGA was a large Swedish gas company that sought to become an electronics manufacturer. During his time there, he concluded that the world really needed high-grade transformers. Nothing of good quality was available at that time in Sweden. And unlike vacuum tubes, for example, a transformer factory could be started on a small scale. So that's what he did.

Together with my mother, who handled administration, they created Lundahl Transformers. My mother and father probably didn't understand what each other did every day, but they managed to work things out very well, capitalizing on their individual strengths.

I understand how vacuum tubes would take significant resources but specifically, why did he choose transformers instead of, say, potentiometers?

My father was fascinated with transformers, which at that time – and today still are – rather complicated components that require careful scrutiny if they're to be maximally optimized. He was not looking for an easy ride.

Who were the original customers?

AGA, where he remained working during the early days of the transformer company, began to manufacture televisions and radios. It was the birth of the stereo era, and a thought at that time was to use the television receiver as one channel of the stereo signal, and a radio for the other. The television needed a transformer to isolate the high voltages for safety, so AGA became his first customer.

I was about five or six years old, but I remember it clearly. The basement of our house, including a built-in garage, was filled with transformer winding machines, a lathe, and a milling machine for production development, plus vacuum-pressure systems for impregnating and curing. In addition to AGA, Swedish Defense and Swedish Radio were also important early customers.

What were the various phases of expansion that led to your present-day facility?

It was originally constructed in 1963, with five later expansions. The third level was the largest increase in area. The roof started leaking so instead of just fixing the roof, we added an entirely new level. Personally though, I like the idea of "the North Wing," which further increased our size and capacity. We were manufacturing a lot of product as the North Wing was completed. Unfortunately, soon afterwards, the market began to decrease as a recession set in.

When – and why - did you switch from conventional bobbin-style designs to your present proprietary methods?

Early on, my father had the idea that he should combine manufacturing with a good tool shop, to not be channeled into

purchasing the standard machinery that other transformer manufacturers were limited to. He started by modifying conventional designs and that concept went much further to creating the machinery that makes our products unique in all the world.

We wind our coils using a “stick method” instead of the conventional bobbins that other manufacturers use. The advantages are better electrical characteristics and more useful sizes and shapes for fitting our transformers into products, especially diminutive ones such as microphones.

I've seen the many different machines that you've designed and built. They appear to be uniquely irreplaceable.

Yes, of course. And that's why we don't purchase them from outside vendors. We build them in-house so that we can build more as needed, repair any that break down, and refine our proprietary designs and manufacturing processes on an ongoing basis.

Let's talk about how you design new transformer models.

New designs are based largely on requests from customers. We first ask them to try models that we already have in place that match as closely as possible to what they require. But there are times when we need to change the turns-ratio, alter level capability, change physical size, or work with other parameters to meet a customer's specific needs. Sometimes it's a simple adjustment; sometimes it requires all new tooling, which we can readily do.

How many models of transformers do you currently produce?

In our standard pro audio range, there are about 70 models that we keep in stock. In our audiophile range, about the same number.

Do you anticipate any significant changes in materials or techniques in the future? Or are materials and processes mostly stable at this time?

Largely they are stable. We use industrial copper for most of our windings and mu-metal nickel cores. Mu-metal is both linear and highly repeatable from one manufactured unit to another. We do get requests for oxygen-free copper wire, silver wire, and amorphous cores, usually in the audiophile side of our business, and we are well equipped to accommodate these specialized needs for our customers.

As for manufacturing processes, we have finely honed our methods and our approach through decades of development, but we seek to always make improvements in every area that we can.

How does an amorphous core differ from a mu-metal core?

Metal is crystalline (when solid) with a highly ordered arrangement of atoms. Amorphous metals are non-crystalline, with a glass-like structure. But while glass is an insulator, amorphous metals are electrically conductive. There are many opinions about how each material affects the sound. We let our customers make their own determinations, and we build for them what they want.

How did you become personally involved with the company, other than the obvious connection through your family? Was this something you always wanted to do from an early age?

No, I never thought I'd replace my father in the business. At one point I was considering becoming a medical doctor, but after my military service as a medical orderly, I decided medicine was not my thing.

After I graduated from the Royal Institute of Technology in Stockholm, I worked as a computer consultant for a start-up company, and later for Ericson. But I wanted to raise my children outside of Stockholm, so I asked my parents if they would like for me to come to work for them, and they agreed. It's now been 20 years.

Have you considered manufacturing other products?

My father designed a magnetic amplifier as an integrated audiophile amplifier unit when my parents were still running the company. In a magnetic amplifier, the amplifying elements are not tubes or transistors, but pre-saturable chokes. It is thus a type of pulse width modulating amplifier.

What became of it?

We sold some units, but when I took over the company I decided to remain focused on transformers rather than trying to become an audiophile company, so we discontinued the project. For one thing, we did not want to compete with our own customer base of audiophile product manufacturers. But still, it's nice to run into people from time to time who have one of these amplifiers and to hear how satisfied they are with the sound quality.

To what extent do you test each and every transformer that comes off your production line?

Thoroughly, to say the least. Depending on the model we perform as many as five tests on each production unit, including function, distortion, continuity, and Faraday shielding, if so equipped. We also test the insulation at 4,000 volts to validate the conformity of the insulation. If the unit passes, then we know it will last almost forever.

What's at the heart of the business philosophy of your company?

Lundahl Transformers is like the Hard Rock Cafe: "Love All and Serve All." We don't play favorites with our customer base, and we provide our best know-how and best quality manufacturing for all customers, large and small. We will continue to manufacture the highest quality products possible, while building additional market share – which means staying closely in touch with industry trends, and each customer's specific requirements.

Our manufacturing capacity is capable of supporting substantial growth so that we need not make excuses when it comes to delivery times. Our driving belief is to manufacture the most transparent and neutral transformers in the world, and to this end we will continue to design, develop, and refine our products.

NOTE: To learn more about the Lundahl Factory, be sure to download Chapter 3 of this white paper series on ProSoundWeb.

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About The Author

Ken DeLoria is senior technical editor for ProSoundWeb and Live Sound International magazine, and has had a diverse career in pro audio over more than 35 years, including being the founder and owner of Apogee Sound.