

# A *Tale of Two* CITIES

*Inside the Benz Micro and Clearaudio Factories*

Jonathan Valin

**W**hen I traveled to Germany to attend the Munich High-End Show this past May, I also got the chance to visit two storied players in the analog world: Benz Micro in Schaffhausen, Switzerland, and Clearaudio in Erlangen, Germany. Given that Benz and Clearaudio are famous for the quality and sophistication of their moving-coil cartridges (two of which I reviewed in the previous article), it came as no surprise to see how much highly skilled handcraftsmanship goes into the construction of these miniature transducers. What *was* a little surprising was how fundamentally different the Swiss and German approaches are—and, in two key respects, how fundamentally alike.

I'll begin my mini-tour with Micro Benz.

The Swiss firm's little "factory" takes up the second floor of a townhouse in Schaffhausen—a small hillside village near the beautiful Rhine Falls, just across the Swiss border from Germany. Inside, the employees—most of them women and most of the most them very old hands at this kind of work—form a small L-shaped production line along the outer walls (1). Hunched over microscopes, they do their painstaking job of cartridge assembly, while mild and retiring Albert Lukaschek, Benz's owner and greatly gifted chief designer, hovers around them like the director of a small high-end Swiss watch shop.

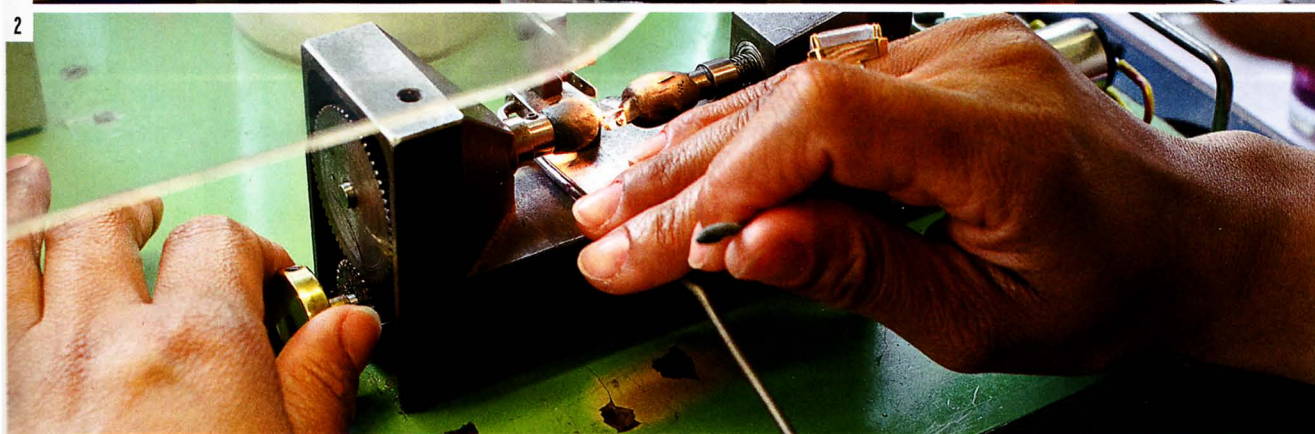
Ernst Benz, whom I got to meet at the factory, founded Benz Micro in the 1970s. Still lean and dashing at the age of 80, Benz was and is a physicist, inventor, and industrial

entrepreneur with a taste for airplanes, adventure, and, oddly enough, music and hi-fi. A specialist in delicate instrumentation and industrial jewels (he currently operates a renowned watchmaking company), Benz developed the ruby plate generator that's still used in the top-line Benz cartridges.

In 1994, Benz's friend and colleague Albert Lukaschek acquired Benz Micro. A brilliant engineer in his own right, Lukaschek continued Benz's technical advancements, developing a number of stellar pick-ups of his own, including the Glider, the Gullwing, and Benz's current top-line LP S-MR—which is, alongside Clearaudio's new Goldfinger Statement, one of the truly great cartridges in the world today.

In Schaffhausen I got to see the step-by-step construction of Benz cartridges, beginning with the assembly of the coils, which are wound and spaced by hand on a machine that Ernst Benz built and Albert Lukaschek further perfected (2).

In one of Benz Micro's signature technologies, the coils' bobbins are machined from pieces of synthetic ruby jewel rather than from iron because, Lukaschek explained, iron makes for eddy currents that cause time and phase delays. The ruby bobbins trade off a bit of output for a reduction in these eddy currents but also allow more windings to boost output (to real-world levels of .35mV and .7mV) and the use of the strongest neodymium magnets, which would make iron-core coils saturate and become nonlinear.



**1** Part of the assembly line in Benz's Schaffhausen facility **2** A coil being wound on Ernst Benz's handmade winding machine **3** Magnetic assembly being attached to the cartridge **4** Aerospace surround material

## FEATURE - Inside the Benz Micro And Clearaudio Factories



- 5** Countersunk pole piece **6** Bronze and aluminum cartridge bodies **7** Final assembly of cartridge  
**8** Checking stylus rake angle via a projector **9** Clearaudio's large beautiful showroom, a tiny part of which you see here, is filled on all four walls with the amazing panoply of analog products the company makes  
**10** A CAD workstation in the Clearaudio plant **11** Double Matrix record cleaner assembly line **12** Turntable production line  
**13** Some of Clearaudio's tonearms **14** One of Clearaudio's CNC machines **15** Hand-assembly of a tonearm  
**16** Papa Bear Peter Suchy, founder and guiding light of Clearaudio

As noted, Benz also uses synthetic ruby for the square plate to which the cantilever assembly is attached, once again to reduce eddy currents (and also to reduce moving mass). In photo (3), one of the technicians is putting the magnetic assembly into the cartridge body. This kind of work requires long experience, intense concentration, and incredible hand-eye coordination.

In another signature bit of Benz Micro technology, the cartridge's suspension—essential to a Benz's non-peaky treble response—uses a special, doughnut-shaped damping surround made for Benz by a U.S. aerospace concern (4).

Schaffhausen to Clearaudio's factory in the picture-book pretty town of Erlangen in German Franconia was a little like traveling from the late nineteenth-century world of handcraftsmanship to the twenty-first-century world of computer-assisted design.

Befitting a company that currently builds everything from cartridges to turntables to tonearms to electronics to record cleaning machines to analog accessories to LPs themselves (Clearaudio has re-released many DG recordings, as well as several new works, on its own label, pressed at Pallas), Clearaudio's factory was much larger than Benz's

a special department for finishing, with turning, molding, and polishing machines that use 10,000 grit silicone-oxide sandpaper to ensure that every turntable shaft fits perfectly into its bearing. In other words, this is the kind of assembly line you'd find at BMW or Mercedes.

The complexity and technological sophistication of the Clearaudio plant was a bit overwhelming, and yet, when it came down to it, all this technology was being put to *exactly* the same use as the painstaking handicraft I saw in Schaffhausen. Indeed, though technology facilitates this process at Clearaudio and makes the ultimate in precision possible, the actual work of

## *Passion in the pursuit of excellence.*

These rubbery doughnuts are precisely located in a countersunk groove in the rear pole piece of Benz's cartridges, allowing for superior compliance (5). Notches in the pole piece further control eddy currents in the magnetic circuit. In addition, a special locking mechanism was developed by Lukaschek to permit calibration of the tension of the suspension and optimization of azimuth.

More expensive Benz cartridges have bodies made from brass, the less expensive from aluminum (6). (These cartridge bodies are the only things that aren't made by Benz.)

In photo (7) a technician fits the terminal block into the cartridge body. The leads from the magnetic assembly are then micro-soldered to the pins.

Every Benz cartridge is checked for proper rake angle and tested in all of its electrical parameters (8). Then they are auditioned with actual music by Albert himself for final adjustment prior to shipping.

As you can see from these photos, virtually everything at the Benz Micro factory is done by hand, often on handmade machinery. The whole enterprise is greatly reminiscent of Swiss watchmaking. However, if Micro Benz reminded me of a small Swiss watch manufacturer, Clearaudio's digs were an entirely different story. Traveling the 200 or so miles from Benz's facilities in

little shop in Switzerland—a huge facility owned by the electronics manufacturer Siemens and spacious enough to serve as offices, show rooms (9), CAD work stations (10), production plant, and shipping hub for all of Clearaudio's many products. (Clearaudio is even now taking over more space in the Siemens building for a dedicated production area.)

Here everything was compartmentalized, with separate rooms for each type of product and numerous work stations within each room, stocked with the in-house-fabricated parts needed for assembly. In the room devoted to record-cleaning machines, there was a production line of Double Matrix Professionals, awaiting completion (11). In another room was a turntable production line (12). In yet another, tonearm production lines that produce an amazing variety of extraordinarily high-quality pickup arms (13).

This was computer-assisted "assembly line" manufacturing, but assembly-line manufacturing with certain crucial differences. For one thing, all of the precision parts that Clearaudio uses in its products are made in its factory to tolerances so high that the company is the only one in Europe that supplies coils for the Swiss super-accelerator. Clearaudio also has multiple four-axis CNC machines for the CAD-assisted milling and machining of select items to a precision of 0.0001mm (14). Clearaudio even has

assembly was still being done by hand by workers—many of them women, all of them longtime employees—with precisely the same patience and skill that Benz's crew showed (15).

Just as alike was the spirit of both places. Like Ernst Benz and Albert Lukaschek, Clearaudio's founder Peter Suchy is a highly educated, highly successful man—a physicist with an illustrious career outside of audio, filled with numerous inventions and patents.

He and Benz and Lukaschek could have flourished in any endeavor (and did before they found their separate ways to audio). That they chose to perfect the means of reproducing music from little squiggles pressed into vinyl pucks suggests that, ultimately, they chose with their hearts as well as their heads. That they created successful businesses that are as much families, actual ones (Peter's sons Robert and Patrick and his daughter Veronika are Clearaudio's chief officers) and extended (at both Benz and Clearaudio, the employees were treated as "family"), as they are factories says much the same thing. And that, in the process, both Benz Micro and Clearaudio manage to create the incredible products they do tells you that passion in the pursuit of excellence, even in something as small and by-the-way as phono cartridges are in today's digital world, is still a winning formula. **tas**