Jörg Wüttke

The public face behind the Schoeps brand discusses small is beautiful, misconceptions about large diaphragms, the 'Digital Bottle', and the problems of cooking with 'pre-seasoned' microphones.

ZENON SCHOEPE

WITH AN INCREDIBLY BROAD range of products in its portfolio, one characteristic of Schoeps microphones is its long-time approach of making mics as small as possible. It does this so the sound field to be picked up is disturbed minimally and because small mics have the practical advantage of being less conspicuous. This concept was pressed home more than 30 years ago with the invention of the 'Active Cable', which allows the capsule to be set up at the recording position and the amplifier to be placed some distance away.

Today it offers 'an even better' form of miniaturization with the CCM (Compact Condenser Microphone) series in which the entire amplifier, with low-impedance balanced output circuitry, is built into the capsule housing. The technical performance of the CCM series competes with that of large studio microphones while surpassing them in acoustical characteristics, according to Schoeps.

This technology was used to develop the CMXY 4V stereo microphone, which is claimed to be the smallest available fully professional X/Y stereo mic. Its capsules are coupled mechanically via toothed gears thus allowing their stereo coverage angle to be adjusted. Other stereo offerings include the ORTF mic, two models of sphere microphone, miniaturized equipment for M/S stereo recording and several different setups for surround. A DSP-based system called PolarFlex allows a stereo recording to be made with complete control of the characteristics of the microphones — their directionality and frequency response — in several adjustable frequency bands. While it can mimic almost any other microphone ever built, its deeper value lies in the freedom to adapt the precise characteristics of a stereophonic pickup to a specific recording environment, before, during or after the recording.

Capsule benchmarks include the supercardioid MK 41 (1964) and the MK 21 (1987), which was the first 'wide cardioid' ever developed with a single membrane. Schoeps offers four different types of pressure (omnidirectional) capsule instead of just the usual free-field and diffuse-field equalised types because it believes that a lot of real-world stereophonic recording doesn't fit neatly into either of these two traditional categories.

Schoeps technical director Jörg Wüttke showed an interest in precision mechanics and electronics from an early age after being introduced to it by his father. He studied electronics and telecommunications at Karlsruhe University, and, as an indirect result of his interest in music, specialised in acoustics, concentrating on research into loudspeakers and phonograph cartridges. From 1967 until his graduation in 1969, he was teaching assistant to Professor Günther Kurtze, the inventor of the shotgun microphone.

He joined Schoeps GmbH as a research engineer in 1970, became its chief engineer in 1972, and is now its technical director. Together with Dr Schoeps, he holds a patent on the Colette microphone series.

He cites innovative design technologies and the design of transducers among his special interests but likes to bear in mind the practical applications of such research particularly with new developments in microphones and recording techniques.

An active member of the AES and a member of the DIN Standards Committee on Microphones and Headphones, he maintains an avid interest in listening to music and recording live concerts as an important link to his other more philosophical interests.

What is special about Schoeps microphone technology?

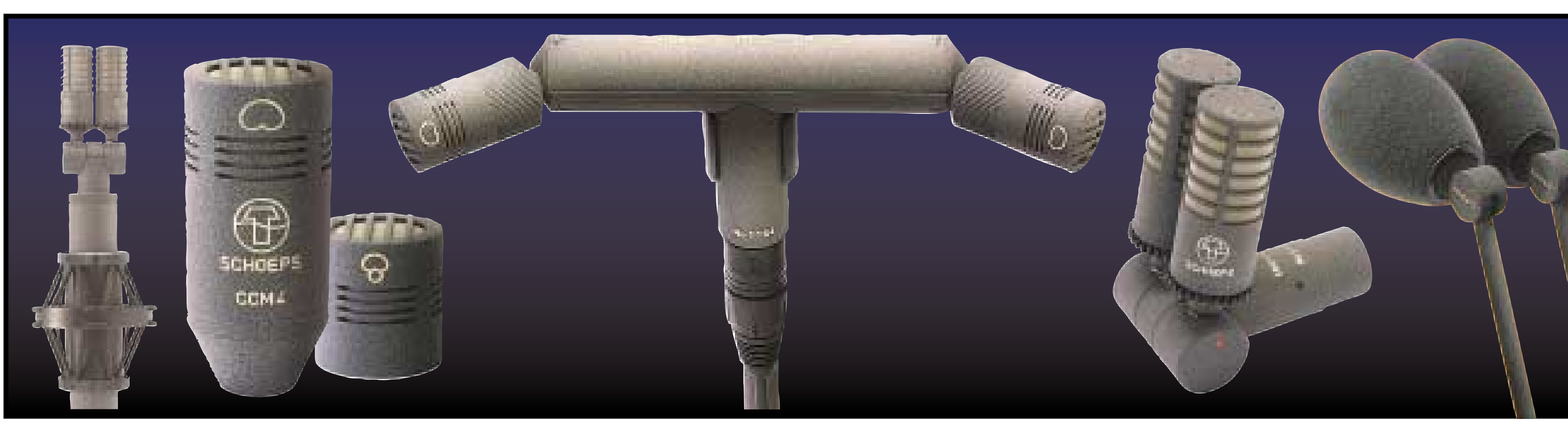
A long list could be made here. The core of our concern is always to obtain the most natural sound possible, with a high level of overall product quality. In the design of our capsules we strive for the greatest possible uniformity of directional pattern across the frequency range, and for frequency response characteristics that are as smooth and flat above 10 kHz as they are at lower frequencies; most of our capsules have response extending well beyond 20kHz.

Since our microphones are small and miniature transformers are beset with problems, in 1965 we developed the first 'iron-free' (transformerless) phantom-powered microphones; this also helped to raise the maximum sound level that our microphones can handle without overload. The very low output impedance of our amplifier circuitry allows long microphone cables to be used without significant signal loss; it also helps to avoid adverse loading effects, thus ensuring that our microphones will sound as intended with the widest possible range of consoles, preamps and mixers.

Why are Schoeps mics so often employed for classical recording?

Neutral sonic behavior is especially highly prized in the field of classical music. A Stradivarius should sound like a Stradivarius and not like a 'violin + microphone'. We don't shy away from helping to foster beauty of tone, but our approach is to achieve it on the basis of reality. For that matter if an equaliser is to be used, it is best by far to start with a signal that is not already complicated by a microphone with strong 'opinions' of its own. Much of what such microphones do to a sound cannot be undone readily if at all.

For a comparison, imagine a good chef whose art includes a knowledge of precisely how to use spices and herbs. If his raw materials are all 'pre-seasoned' he will have problems! One can always add distortion, but it is hardly possible to remove it once it has been added.



Why is that the majority of 'classic' mics tend to be of large diaphragm design?

There are strong historical components to this situation. It is more difficult to make microphones small; in the early years it was altogether impossible. But since even the earliest condenser microphones were remarkably good, the use of large condenser microphones became a tradition with many users. One can be content with large microphones, especially if one chooses them by eye; large microphones look imposing, and thus are also prestige objects. Nonetheless I propose relying primarily on your ears-wherever possible, making sonic comparisons without falling victim to any visually inspired expectations.

What are the popularly held misconceptions about large and small diaphragm mics and what is the reality?

One widespread error is the belief that large-diaphragm microphones are better at picking up low frequencies. It is simply not so. While on that subject, the fact to the contrary is that large membranes present quite complex problems at high frequencies. But even the smallest membrane can have flat response to arbitrarily low frequencies (even DC) if the capsule is arranged as a pressure transducer.

The basic difference between microphones and loudspeakers seems to elude people's reasoning on this point. A loudspeaker must be large enough to deliver substantial acoustical power to a room. But a microphone's membrane acts as a sensor — it only has to follow the incoming sound waves, and a small diaphragm can do that more accurately than a large one.

The air on both sides of a microphone diaphragm must, of course, move along with the membrane; the mass of this air 'cushion' is greater than that of the diaphragm itself, and it is the primary means by which the membrane's resonance is damped mechanically. The notion that exotic materials or ultra-thin membranes can give microphones a 'faster' impulse response is therefore unjustified — this apart from the exaggerated notions that some people seem to have about how 'fast' a membrane's response should actually be.

There is another misconception, on rather a different level. Just now it occurs to me that the routine use of the attenuators built in to condenser microphones is technically problematic. If, unfortunately, you really do have a microphone input that can't handle the output levels of a modern condenser microphone, then using a balanced, in-line resistive pad at that input is the best solution. It will attenuate the microphone's self-noise as well as the signal and any interference picked up in the cable, thus preserving an optimal signal-to-noise ratio. Most attenuators built in to microphones attenuate only the signal, leaving the microphone's self-noise and any interference picked up in the cable nearly unaffected.

What are the advantages of separating the capsule and the preamp as you have in your designs?

By being able to separate the capsule and amplifier, you can also interchange capsules on a single amplifier; the main advantage is then in the cost savings to our clients. Many of our customers own more capsules than the number of microphones that they are ever required to use simultaneously. This allows them, for a given total expenditure, to build up a far more flexible set of tools than they could own if they always needed to buy an amplifier for each capsule. We sell fewer amplifiers that way, but our customers are happier and more productive, so it works out well for us.

This could be compared to the situation with single-lens reflex cameras and their interchangeable lenses. However, interchangeability does make the task of designing and building the microphones somewhat more complex, which is why our Compact Condenser Microphones do not have interchangeable capsules.

Where are the typical areas of compromise made in old and modern microphone designs and manufacture?

Once again I have to refer to issues of size. After everything I have said, we would be happy to make even smaller microphones but then we would not be able to meet the demands of studio engineering with regard to noise levels. Thus the diameter of nearly all small-membrane microphones represents a compromise. Our microphones are nearly always below the noise level of the studios themselves. But large diaphragm microphones can have lower noise if engineered specifically for that, and in recent years a few such types have actually been produced — though that is not by any means the norm.

What is your reading of the 'digital' microphone issue and what do you think is required?

We should express it correctly: what exists today are analogue microphones with conventional capsules, analogue impedance convertors and built-in A-D convertors. Something to fear is that the digital part of that arrangement will become obsolete as quickly as our computers do already. That would stand in crass contrast to the traditional long service life of professional condenser microphones, with some types made 40, 50 and even 60 years ago remaining in use today.

For that reason we have taken a modular approach in which the analogue part is exchangeable and can be used on its own. In a reference to the old vacuum-tube microphones, we are calling the digital part the 'Digital Bottle'.

There are various advantages to such microphones. One is that good analogue microphones can handle a dynamic range of about 130dB, and with digital technology this dynamic range can be passed along undiminished to the recording and reproducing system. In practice, this means that one no longer has to set levels. A second advantage is that a variety of parameters, particularly the directional pattern, can be remote controlled via the AES 42 port. There is also a return flow of information available to confirm the microphone settings you have made.

There are a multitude of ways to capture surround or multichannel sound, what is you opinion on the various 'standards' and their suitability for the job?

The complete answer to this question can be given only at greater length, such as in the paper I gave at the AES Conference in Elmau, but I would make the following points in brief. That surround can be successful has been proved by film and video but the production of impressive music recordings in surround is still problematic. The situation is so complex that only a scientific approach could lead to convincing results.

In any case, more attention must be paid to the centre channel even in pure musical productions. How would anyone justify the purchase and installation of an expensive 5.1 playback system if all the recordings are made such that, for example, the centre channel could equally well be dispensed with? We must get the best possible use from all the channels if we wish to win over the consumer.

What are the remaining technical limitations of microphones today? Can they be improved? Where is it leading?

I have no doubt that microphones can still be improved. The question is which improvements will be heard and valued by the end user. Unfortunately the wishes of the customers diverge so much that it is scarcely possible to derive goals from them. And the many fans of original 'vintage' microphones could easily give you the feeling that there is nothing more for a microphone manufacturer to accomplish. What would happen to us all if everyone looked at things that way? In any event, it isn't possible to bring back the 'good old days' with their music and their performers through nostalgia.

Given that microphones, like every other aspect of audio technology, have decreased in price and improved in performance how have end user attitudes changed to quality?

End users are actually rather more responsive to quality today than they were in the past. That explains why products that are not made in the Far East, and that are therefore considerably more expensive, can still be successful. Competent support, service and advice for customers also belong with a quality product. ■

Website: www.schoeps.de