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Fohhn Focus Modular

Conclusion :
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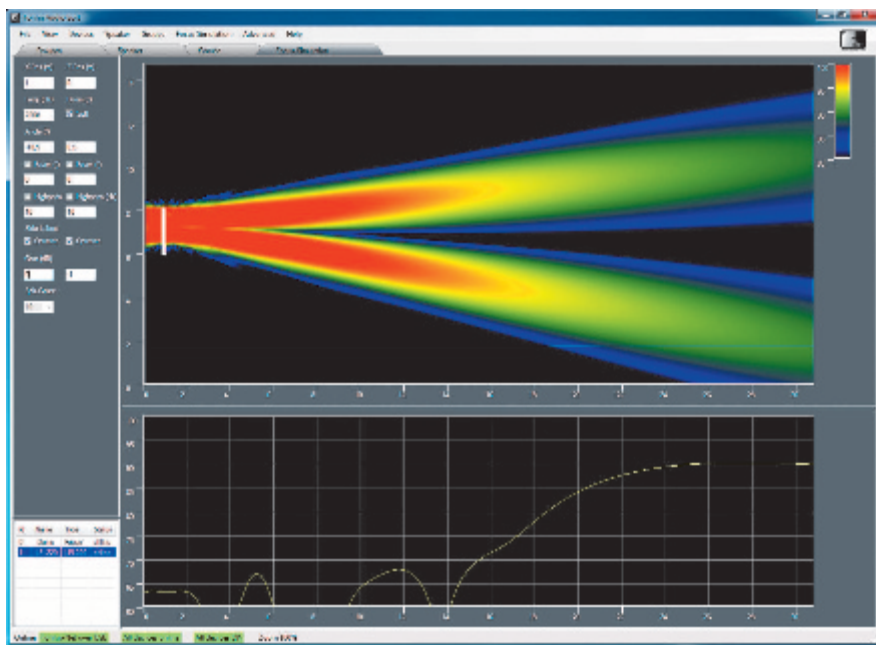
Fohhn Focus Modular: More power. More purpose.

The work involved in developing high-end line array technology to cope with acoustically challenging situations has been something of a roller-coaster ride for Fohhn. Now established, the technology has more recently been applied to the manufacturer's new modular series, ready to meet even greater performance demands. A visit to the company's Nürtingen headquarters gave us an opportunity to find out more.

At times, it's easy to gain the impression that every other garage in Swabia is home to a pair of enthusiastic "developers" designing and building high-end loudspeakers. It has clearly been a while since Fohhn Audio AG emerged from the proverbial garage to establish itself as a rock-solid, successful, medium-sized company with a 20-year history, while at the same time aiming to be regarded as one of the top players in the international market. A glance at the current catalogue and a visit to Fohhn headquarters in Nürtingen confirms that this is indeed a company that is both innovative and ambitious - a fact also reflected in the ubiquitous "Sounds Perfect, Is Perfect" slogan that is certainly no mean statement.

Backing up this claim is made easier by the fact that all the shareholding of Fohhn Audio AG is entirely within the company, which means that company and development policies are not merely driven by short-term interests such as profit. Corporate policy is not determined by shareholder value, but by the application and realization of sophisticated standards in development and production, even if that means occasionally shrinking profit margins. Actual profits are ploughed back into the company, avoiding the need to keep an anonymous set of external shareholders happy, which could otherwise potentially compromise the quality of the Fohhn systems.

Another significant factor is that all Fohhn employees are not only highly educated, many having specialist knowledge, but are also extremely motivated. During our visit to the factory in Nürtingen it became apparent that employees have an outstanding level of personal interest and pride in the manufactured products. From the many we were able to speak to, whether in research and development or assembly, their enthusiasm really shone through. Quite a number of employees are additionally active as sound engineers or musicians and are therefore also familiar, from those perspectives, with the requirements for a professional loudspeaker system.



Useful in a variety of venues: Two separate electronically steerable beams can be generated from each loudspeaker. Both beams occupy the full line length.



Custom flying cradle for Focus Modular. The speaker's front grille is ball impact resistant.

All research and development work is carried out at on the Fohhn premises in Nürtingen using the company's own unique SoundLab. The room, with its massive dimensions, is used both as a showroom and as a test and development laboratory. A custom-developed Fohhn measuring robot, along with the company's own measurement technology, is on permanent standby so that every new product can be put through its paces and appropriately evaluated and documented at each stage of its development.

An additional factor that can't be ignored is Fohhn's Swabian location. The southwestern region of Germany is renowned as the republic's most concentrated area of industrial innovation. Any component that cannot be produced directly by Fohhn is sourced nearby from a highly specialized subcontractor who manufactures the

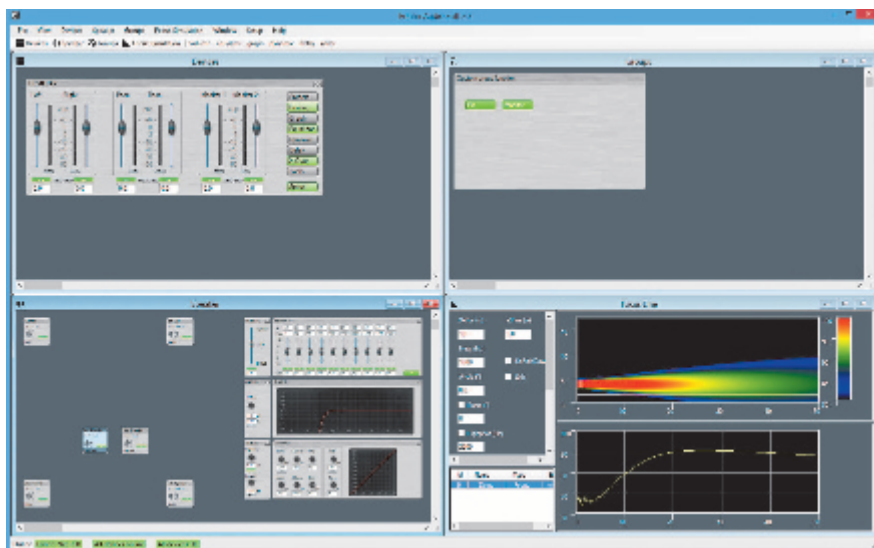
necessary components according to Fohhn's exact specification. Off-the-peg solutions, or low-grade products from relatively unknown manufacturers simply aren't an option. In general, Fohhn has worked with the same suppliers for a number of years. This continuity guarantees that a consistently high standard of quality can be maintained. Final assembly and quality control is of course carried out at Fohhn, with every single loudspeaker undergoing a rigorous and detailed series of electronic, acoustic and visual quality control procedures.

Line arrays: from vaguely amusing concept to trend-setter.

With its 20-year company history, Fohhn has garnered a great deal of respect for its considerable product portfolio that provides a more than adequate solution for just about every conceivable sound reinforcement application. Line source technology has played a significant role in this context. However, not so many years ago this type of loudspeaker had a rather dubious reputation. Relatively few people expected to see great results from what was even regarded by some as a slightly amusing concept. The fact that this view has now changed significantly is due to the quality of line source systems produced by manufacturers such as Fohhn.

An example in question is the Linea Series, developed for use in acoustically challenging venues such as churches, conference halls, airports and other similar environments where speech intelligibility is high on the agenda.

The systems have also proved very suitable for music reproduction.



Fohhn integrates line array and subwoofer beam simulation and control, plus a range of audio tools, in one single piece of software.



The three modules FM/I-100, FM/I-110 and FM/I-400 are equipped with a range of different HF / Mid / Low-Mid drivers with individual amplifiers and DSP channels. The FM/I-400 is 1.64m tall.

Whether for fixed installation or mobile use, the various Linea Series models have become well established, proving a reliable (and uncomplaining) workhorse. Fohhn's next step forward involved the development of the Linea Focus series. The models belonging to this series comprise active, electronically steerable (via software) mini line array speakers that enable the user to directly target specific audience areas, even in challenging venues, without acoustically activating the entire room. Importantly for the user, this can be achieved via a simple, self-explanatory piece of software that enables both the speaker beam's vertical dispersion range and inclination angle to be modified more or less in real time, thanks to extremely low latency. The computing power of the DSPs used, combined with Fohhn's in-house development efforts, have resulted in the ability to adjust the vertical beam width (0-90°) and vertical sound inclination angle (-/-45°) in almost infinite 0.1° increments. As in other parts of the industry, Fohhn uses the term Beam Steering to describe this particular functionality, but the process itself originates from antenna technology where it was, and still is, used with steerable antenna arrays. Within the audio world, Fohhn describes the concept as "controlling the beam characteristics of loudspeaker systems via electronics and software". However for both types of application, the associated physics is basically the same, although the frequency range to which it is applied obviously differs. With a common system concept underlying all Fohhn products, it soon becomes clear that Fohhn's beam steering technology lies both at the heart of its loudspeaker, amplifier and DSP technology, as well as in its associated control software and networking technologies.

Building on previous experiences, the most recent step for Fohhn has been the development of the new Focus Modular series. The modular line array systems with beam steering capability have been designed for both fixed installation and mobile use. High performance, high-frequency modules with 1" compression drivers, Waveguide and horn can be combined with low-mid modules and specifically adjusted to cater for the

development. In what ways do modern line arrays differ from earlier systems?

Uli Haug: Classic passive line arrays seem to have been around forever. Earlier systems tended to have been quite simply constructed, offering very few technical refinements. They would also be equipped with a basic broadband chassis type, which, in our view simply doesn't meet the current requirements in terms of dynamics, frequency range

systems over conventional loudspeakers really become clear when you have challenging room acoustics. A well-constructed line array will have a highly directional, homogenous vertical beam (15 to 30 degrees) and a natural, broad horizontal beam (100 to 140 degrees). In the vertical axis, a narrow, well-defined beam helps minimize the effect of unwanted reflections from the floor or ceiling. This results in more direct audi-

"Even the smallest adjustment to a loudspeaker beam can be noticed immediately. That gives the user a real feeling of confidence."

Uli Haug on beam steering

size and acoustic conditions of a particular venue or event. In addition to its extremely long reach and high levels of speech intelligibility, Focus Modular also delivers a very musical sound, which, in combination with a Focus Sub Array, leaves little more to be desired.

A detailed demonstration of the system left us in no doubt. The sound bore absolutely no resemblance to that of the old-fashioned line source systems, appearing not only modern and well defined, but also powerful and transparent. For just about any current sound reinforcement requirement, this system will absolutely fit the bill.

Interview with Uli Haug: Effectively targeting your audience

During our company visit, which also involved a Focus Modular demo, we were able to talk to Fohhn Audio's Uli Haug about the technological background and applications of Fohhn's current product portfolio.

Production Partner: Over the last few years a lot has been happening in the field of line array development, with Fohhn playing a significant part in that

and sound characteristics. What's more, their beam characteristics are inhomogeneous in that all the speakers produce a similar kind of sound coverage and don't tend to incorporate high frequency drivers.

With us it's different. We've devised our own approach to the solution.

With our passive line arrays, we work entirely with two-way (or multi-way) systems. High, mid and low-mid speakers are individually controlled via an intricate filter system guaranteeing a homogenous sound over the entire frequency range. Our loudspeaker chassis are specially constructed, robust and capable of generating excellent dynamics. In the low-mid range we use a specially coated long excursion speaker. For high frequency drivers in both the Linea LX and Focus Modular ranges, we use a high performance, horn-loaded 1" compression driver/ wave guide system. This gives a natural, powerful and dynamic sound to both speech and music.

Production Partner: What do you consider are the advantages of line arrays over more conventional loudspeaker systems?

Uli Haug: The advantages of line array

ence coverage, better speech intelligibility and much less chance of feedback. Another advantage lies in the more compact design of the so-called "all in one" line arrays. Conventional mechanically curved line array systems comprise a number of separate units. These have to be manually combined and curved, which takes time and is therefore both labour-intensive and costly. Our line arrays consist of either a single compact lightweight unit, or in the case of Focus Modular, a few separate units that can be quickly combined and flown directly under each other.

Production Partner: Your Linea Focus series has caused quite a stir over the last couple of years, as well as collecting a few awards. What makes this system so special?

Uli Haug: For our customers and users it's been all about the systems' outstanding reproduction of speech and music, as well as the intuitive real-time steering capability via Fohhn Audio Soft. I think it's fair to say that, up to now, our systems are the only ones that offer precise real-time adjustment in 0.1° increments using just one piece of software.



The connections for two combined modules – power, audio in/out and remote control/monitoring: temperature, protect, signal, power supply, Fohhn-Net, Fohhn Audio Soft, Pilot tone monitoring.

All Linea Focus series models offer real-time electronic adjustment of both the loudspeaker's vertical sound inclination angle ($\pm 45^\circ$) and vertical beam width ($0-90^\circ$). Therefore it's not necessary to rely on pre-programmed presets. What the user sees in the software simulation is exactly what will be heard. Even the smallest adjustment to the speaker beam will be immediately noticeable and can be instantly evaluated without any time delay. Again, this gives users a

real feeling of confidence and enables them to achieve the best possible results. Our electronically steerable systems also offer Two Beam Technology – in other words, two separate beams can be generated from each loudspeaker. Both beams make use of the speaker's full line length. Another feature is the Side Lobe Free Technology: this effectively suppresses unwanted side lobes that inevitably occur.

Production Partner: Beam Steering itself isn't a new concept, having of course been used for years in antenna and receiver technology – albeit it in a much higher frequency range. **Uli Haug:** Our electronically steerable array systems have been specifically developed for both live sound and fixed installation applications. In order to achieve the best possible results in both situations, it's important that any control software used has real-time operating capability and is also very intuitive. This enables the user to quickly set up a system and target the audience area as precisely as possible. Our entire loudspeaker / beam steering control process is carried out via one single piece of software – Fohhn Audio Soft. This program enables a system to be set up from scratch and any settings to then be further adjusted – even during an actual event. Time is also always a major factor. In live situations there's often barely enough time to set up and adjust the system beforehand. It's also the same with installation projects where the loudspeaker system is inevitably installed last and under great time constraints. For example, imagine an airport installation project with over 70 loudspeakers – quick, precise work is of the essence in a situation like this.

Production Partner: As with antenna technology, Linea Focus can also work with two separate beams?

Uli Haug: Absolutely. All Focus Series products include Fohhn's Two Beam Technology that enables two separate beams to be generated from each loudspeaker. This is a great tool. For example, using just one loudspeaker, you can simultaneously cover both stalls and a balcony area with one beam each. In this particular situation, the advantage is that the speaker beam won't collide with the front of the balcony, generating unwanted reflections as a result. Also, if an event has fewer people than expected and the balcony area is not used, the beam intended for that area can simply be switched off using Fohhn Audio Soft. Two Beam Technology also lets you generate asymmetrical beams.

For example, one beam used to cover the first few rows can be reduced by 6dB, while a second beam can cover the middle to back of the room at full power. This kind of sound pressure level split just isn't possible with conventional loudspeaker systems, but here, the front rows have a "pleasant" level of coverage while at the back you can also hear everything perfectly.

Production Partner: What can we understand by the term "Side Lobe Free Technology"?

Uli Haug: All mechanically curved line array systems produce naturally occurring, unwanted side lobes. These occur as a result of the distance between the individual sound sources (drivers) and the finite length of the array. However, we have developed a special algorithm that will effectively suppress these side lobes. It proves particularly effective for enhancing speech intelligibility and also for reducing the risk of feedback where microphones are involved.

Production Partner: How does the new Focus Modular series fit into the product family and how does it differ – apart from its size – from the other Linea Focus models? Fohhn's claim to have "taken Beam Steering to a new performance level worldwide" is quite a statement...

Uli Haug: That's right! After our Linea Focus systems had been successfully deployed in a number of extremely challenging international projects, it became clear that beam steering systems were a necessity for very large rooms, halls, cathedrals etc. To cater specifically for this kind of situation, and to complement our non-modular systems, we developed a more powerful modular system with high performance 1" compression drivers, waveguide and horn. The high-frequency FM/I-110 module, which contains 16 very high performance 1" high-frequency drivers, 16 Class D amplifiers and 16 DSP processing channels, can reach a maximum SPL of 148dB at a distance of one metre (108dB at 100 metres). The other high-frequency module, the FM/I-100, equipped with eight high-frequency drivers, can reach a maximum SPL of 142dB at a one-metre distance. A single high performance low-mid FM/I-

400 module can reach a max SPL of 134dB at a one-metre distance. That's a level of performance, which, in the beam steering world has not previously been achieved.

The difference between Linea Focus and Focus Modular isn't only in their performance capability. Focus Modular is essentially different in its modular construction. The fact that modules can be cascaded means that individual units can be quickly and securely combined to meet the specific demands of a particular venue. For example, a high-frequency module can be combined with several low-mid modules, or a separate high-frequency module used as a "centre cluster". Focus Modular systems are completely flexible and, compared with other systems of similar performance capability, are also remarkable for their low weight – the largest module weighs just 41 kg.

Production Partner: What do you consider to be the main applications for Focus Modular?

Uli Haug: Focus Modular has been developed for both fixed installations and mobile applications. For fixed installation, the electronic control capability means that systems can be mounted flat against the wall, or even integrated into the wall itself. The modules' unobtrusive appearance and a choice of any RAL colour for the speaker housing enables Focus Modular to blend perfectly with more or less any kind of interior. Focus Modular systems are also ideal for mobile use, with their compact dimensions, easy handling, low weight and of course their powerful performance capability proving an enormous advantage. For transportation they take up less room than conventional line arrays, the load is much less and the set-up time is considerably shorter. The integrated Fohhn rigging system means that several modules can be quickly and safely combined without the need for additional tools. Beam set-up is done in real time via laptop, and of course further adjustments can be made at any time.

Mobile applications include conferences, large-scale meetings, concerts and music tours (including church and cathedral venues). Fixed installation use includes

conference centres, cathedrals, town halls, theatres and opera houses, railway stations, airports, stadia etc.

Production Partner: In addition to the Focus Modular systems, Fohhn also offers beam steering technology for subwoofer arrays. What are the main features of these sub arrays?

Uli Haug: Using just six Fohhn subwoofers of any size, you can create a highly effective subwoofer array. The subs can either be placed horizontally at an equal distance from one another, or flown vertically in a column. Each subwoofer can be individually controlled via its own amplifier and DSP channel. Within the Fohhn Audio Soft software, the subs can be selected and formed into an array. In the Focus Simulation window, the beam characteristics of each sub can then be adjusted in real time using a mouse. As with Focus Modular systems, the dispersion- and inclination angles (i.e. the lateral swivel angle) can be minutely adjusted in increments of 0.1°. End fire sub array systems can also be easily created.

Production Partner: So what's next? Are the new Focus Modular systems already in operation?

Uli Haug: Our first live projects have already been completed. These have included the Ball der Nationen in the Beethovensaal of Stuttgart's Liederhalle, a rock festival featuring eight international bands and a large industry event at Audi. Over the next few months there are some more events coming up, for example in the Welttheater in Einsiedeln, Switzerland, as well as several classical concerts that will all be reinforced by Focus Modular systems.

On the fixed installation front, the new Danish Congress Centre in Copenhagen was recently equipped with Focus Modular systems. Later this year we have the VCC in Recklinghausen and a big university project to look forward to. We're also very pleased that during this year's SIEL Show in Paris, Focus Modular won a coveted 'Etoiles du SIEL' award for innovation.

◆ **Text:** Thomas Zahn
Fotos: Fohhn