



Weekly Newsletter for the Audio Industry and Audio Product Developers
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Guest Editorial

Mike Klasco

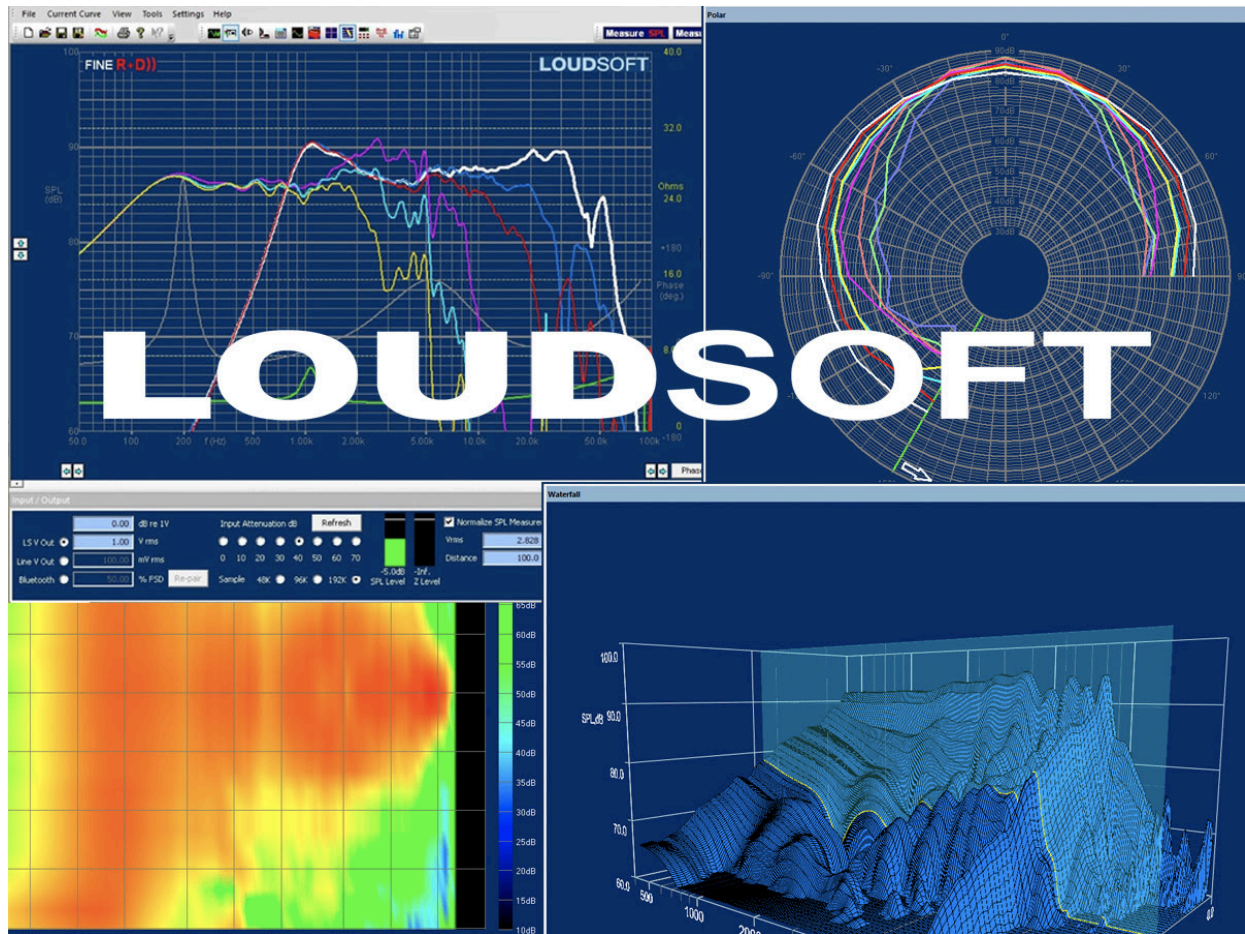
(Menlo Scientific)



Speaker Industry Celebrates 25th Loudsoft Anniversary

Many of the tweeters we use today have sprung from the imagination of a Danish fellow, Peter Larsen, affectionately known in the speaker industry as "Tweeter Peter" from his days at JBL in the 1990s. Peter and his wife, Dorit, are also business partners in Loudsoft, the esteemed developer of speaker design software and test instrumentation. Many *audioXpress* and *Voice Coil* readers are familiar with Loudsoft and its FINE range of loudspeaker design software products, including the excellent FINE R+D Acoustic Audio Analyzer, which Vance Dickason implemented into his [Test Bench measurement protocol](#).

Loudsoft is in the science park just north of Copenhagen in Denmark, in the old town of Horsholm, established in the 1730s, and where several of the communities that make up the municipality are even older. That's where Peter and Dorit Larsen - and now also their daughter Britt Larsen - are celebrating 25 years in business, also signaling Peter Larsen's 50-year career and innovative contributions to speaker engineering.



Loudsoft's FINE Test & Design software for speaker R&D and QC.



Loudsoft's headquarters in Horsholm, Denmark.

Peter Larsen started his career with SEAS in 1974, and as Chief Engineer for Vifa (an abbreviation of Videbæk Fabrikker) from 1979-1987. Thereafter, he went to Dynaudio from 1987-1990 as chief engineer, where he developed the D260 Esotec, and the 15W75 and 20W75 cast aluminum basket speakers. During his time at Dynaudio, Peter developed a more efficient and higher-consistent production method. At the same time, the workers got more interesting jobs, a "must" in Denmark as a pioneer for good working conditions. Next, Peter went to JBL in the US in 1990.

Since 1993, Peter has worked as an independent consultant for leading loudspeaker factories all over the world: Audax in France, KEF Audio in the UK, Goldmax in China, Vifa-Speak in Denmark, Peerless Fabrikkerne in India, NXT in the UK, Microlab in China, Apple in the US, and many others.

While Peter has contributed significantly to dome tweeter design, these all look the same, at least at first glance. In the tweeter world, more noticeable and unique is Peter's ring radiator. According to Peter, it was created one Friday afternoon, from a blend of curiosity, skills, and coincidences. While working on this at Scan-Speak, a dome tweeter project was not going as intended, and repeated efforts did not yield the desired results. Peter is a resourceful fellow and decided to take extreme measures, which consisted first of consuming a couple of beers (it was the end of the week after all), after which he decided to punish this tweeter that would not behave and stuck a pin in it!

Peter discovered that the "pinned" tweeter not only sounded better, but it even measured better when clamped in its center! This was the beginning for Peter's Ring Radiator, a design favorite copied by many Asian factories (although Tymphany is a legitimate vendor) and used in thousands of loudspeaker systems. Driven by curiosity, I did ask Peter what brand of beer was key to his ring radiator design process, but he did not respond.

Decades later, the ring radiator is about to find a new application, and that is in the Davi Audio concentric dual ring radiator headphone design. The "woofer" ring radiator is, of course, the outer transducer with the "tweeter" ring radiator in the center. Fabricated with a watchmaker's precision in the US, this headphone is at the far edge of the luxury market at \$25,000 (actually, a couple are thrown in for free by the factory when you buy certain brands of private jets).

While working as an independent consultant, Peter specialized in in-depth analysis of loudspeakers and manufacturing techniques, research concerning new components and materials, advanced Acoustic Finite Element modeling, new measuring methods, and many novel speaker design concepts. During the same period, Peter developed and globally marketed the Loudsoft speaker development and design programs. Of course, most of us also know Peter for his always insightful and detailed papers, workshops, and sessions presented at the Audio Engineering Society (AES) conventions, as well as for ALMA (now Audio & Loudspeaker Technologies International - ALTI), and articles written for Voice Coil and other publications.



The Ring Radiator tweeter, with its patented dual concentric diaphragm and a unique waveguide center plug, is used in thousands of loudspeaker designs and available from Scan-Speak, Visa, Peerless, and Peerless by Tymphany.



Davi Audio. These ultra-luxury Giugiaro-styled headphones have largely benefited from Peter Larsen's work on its unique two-way concentric dual ring radiator design.



The MicroLab Pure 1. The PURE Monitor series for Microlab "by Peter Larsen" is one example of his many designs.

Of course, Peter is the face of Loudsoft - but so is Dorit Larsen. Dorit first became involved with the loudspeaker industry in 1974 when her husband began his career in loudspeaker engineering. In the late 1980s, Dorit helped Dynaudio get substantial support for export and development from the Danish state, and it was a very big help to the ongoing growth of the brand. Since 2001, Dorit has spent her time with Loudsoft, where she is in charge of administration, sales, and marketing. Dorit was elected to ALMA's Board of Directors in 2007. As the European Vice President of ALMA, for some years, she organized loudspeaker industry events at the Frankfurt Prolight+Sound shows with success.

And talking about ALMA, Peter Larsen was the recipient of the prestigious ALMA Titanium Driver Award, which recognizes a specific technical contribution, accomplishment, or expertise in the loudspeaker industry. Peter received this award at the January 2012 ALMA symposium in Las Vegas, NV, which traditionally preceded CES. Specifically, the ALMA award was for his constant effort and expertise within driver development and his hunt for better speaker designs for the loudspeaker industry worldwide.



A remarkable example of Danish ingenuity, the Aiaiai Unit-4 Wireless Monitor is another project with significant contributions by Peter Larsen.

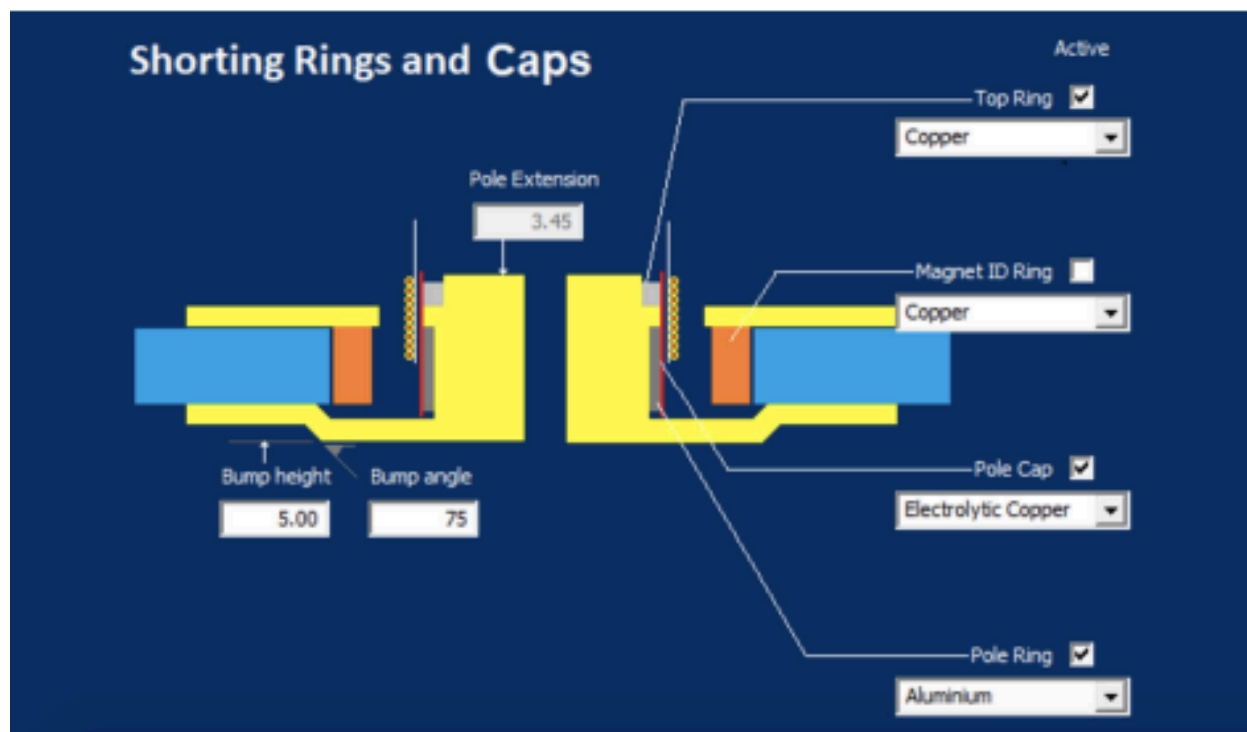


Peter Larsen and Vance Dickason at the ALMA Symposium & Expo 2018 - the last edition of this influential speaker industry event.

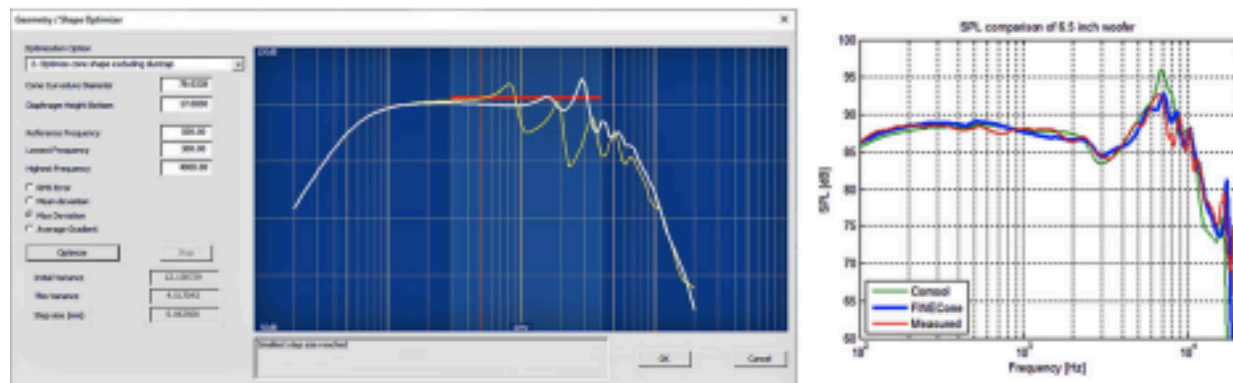
FINE Test and Design Software

Long before the concept was touted, Peter became a pioneer in "digital twins" transducer and speaker system simulation and validation thanks to the FINE family of cone, motor, enclosure, and crossover simulation tools. Loudsoft is also globally recognized for its FINE R&D and QC test instrumentation.

Based on Peter's experience in designing loudspeaker drivers over the years, FINEMotor evolved into a full-featured program to design magnet systems and voice coils. While other computer design tools for general-purpose magnet simulation are well-established, FINEMotor PRO delivers easier and quicker results for speakers and transducers. The latest version has fast FEA calculations and can optimize pole pieces and predicts $BL(x)$ curves and voice coil offset. In addition, voice coil induction $Le(x)$ is calculated, and many different shorting rings can be directly designed to linearize $Le(x)$. And it will even design microspeakers with rectangular voice coils and motors. Like all Loudsoft software, it runs in Windows 10 and 11 (64-bit).



Peter Larsen was inspired by the work of Dr. Henrik Vollesen at Bang & Olufsen, and his analysis of the mechanical and acoustical properties of a loudspeaker unit with controlled directivity. Realizing the potential of using Henrik Vollesen's ideas in the design of cones was the start of their collaboration to create FINECone. One of Loudsoft's most popular programs, FINECone Loudspeaker Cone Design Software is powerful and used for everything from troubleshooting to the design of cones, domes, surrounds, or dust caps, as well as optimizing the driver. It can animate all kinds of cone/dome break-ups and predict the SPL response including fine details. The latest features include improved "Shape Optimization" with tuning of cone profiles, new materials in the database, including Glass and Carbon Composite, and a faster FEA Optimizer, offering <1.0 second for full FEA calculations.



This curve is a good illustration of the potential of FINECone. The simulation comes very close to the measured response.

In 2003, Bang & Olufsen (B&O) in Denmark wanted to develop a new compact loudspeaker. The design, of course, had to be special, so they asked the Danish driver supplier to design the cone according to the design demands. That supplier could see that the design was not practical, and that the resulting performance would be poor. B&O's reaction to the supplier's report was: Prove it!

In those days, the supplier would have to manufacture a tool – which they knew would not work – at the price of more than US \$30,000, requiring 8 weeks of tooling time, just to prove their point. Instead, that supplier asked Peter Larsen for support. In just 4 hours of simulation work with FINECone, he proved that the results would be poor. With another 4 hours of work, Peter changed the design in such a way that it could fulfill B&O's design ambitions and deliver good performance. That speaker was called Beolab 3 and was in production for decades.

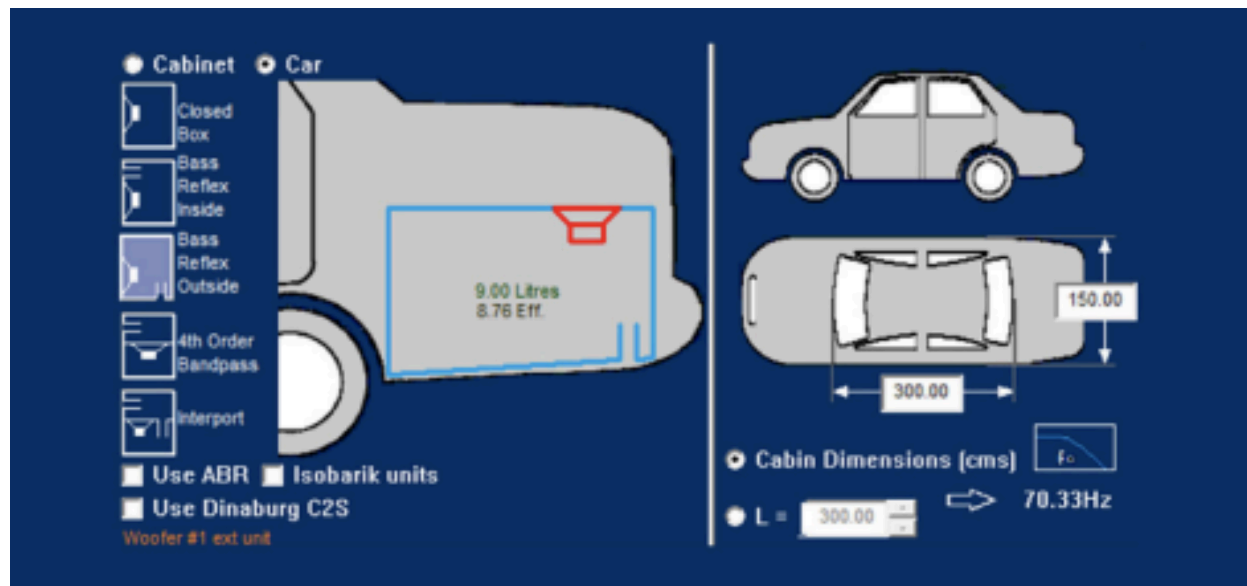


Working with FINECone, Peter Larsen was able to make this Bang & Olufsen Beolab 3 design a success that lasted for decades.

Another interesting development for Loudsoft has been the progress made in the automotive sector. Peter Larsen has been involved in multiple projects for brands such as Bentley or Volvo, and many car audio systems from Dynaudio. Already embraced by many companies in that field, including Bose, Ford, and Sonavox, Loudsoft's FINEBox PRO 2025 expands the possibilities in automotive even more, adding calculations for loudspeaker responses with Car Cabin gain, Closed Box with Car Cabin gain, Bass Reflex Box with inside port plus Car Cabin gain, and Bass Reflex Box with outside port plus Car Cabin gain.

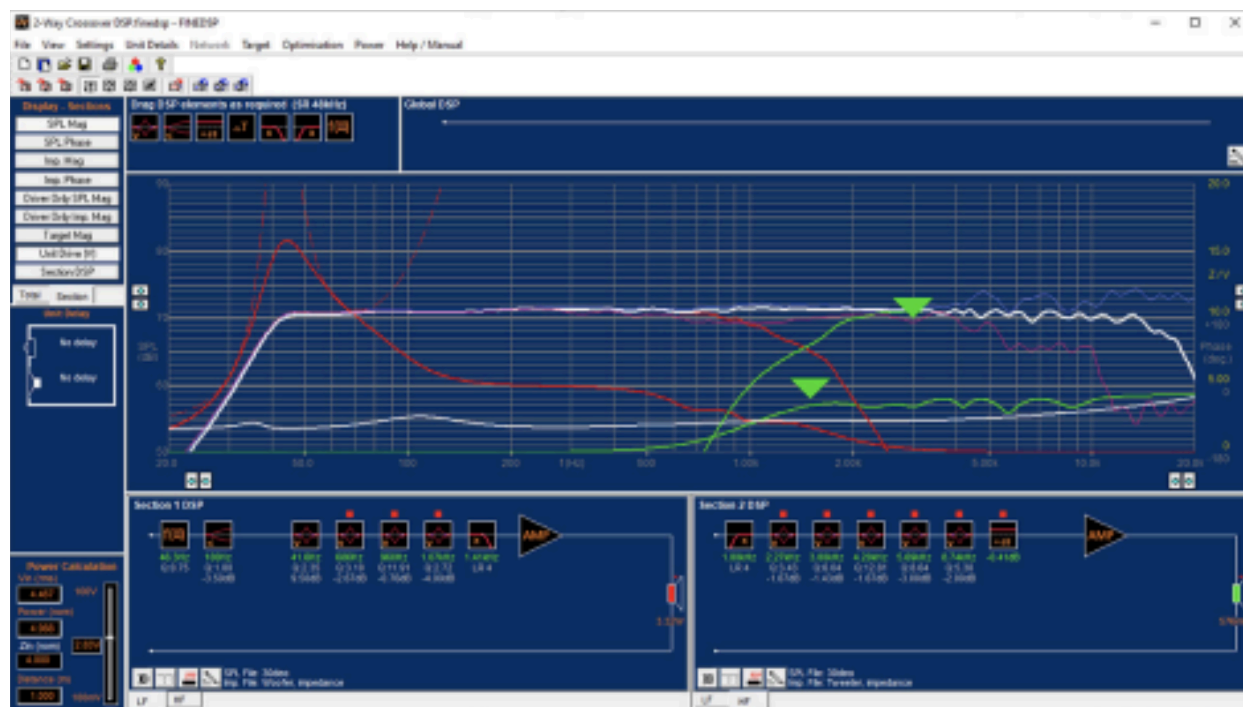
This Automotive option offers cabin gain calculations for closed box plus inside and outside bass reflex ports. Even a closed box can give a well-extended low frequency response in the cabin. The Bass Reflex Outside has the port connected to the outside of the car. Due to the sometimes-high cabin gain, the box can be quite small and still provide an extended low-frequency response in the cabin.

The features supported by FINEBox PRO include nonlinear high power box design for all types of loudspeakers, from hifi to professional audio, as well as microspeakers and headphone drivers. The software supports valuable simulations of voice coil temperature and compression at high power in closed box, reflex, ABR, band-pass and inter-port alignments. All nonlinear Thiele-Small (T-S) parameters + thermal data can be imported directly from FINEMotor, and using Inverse FINEBox it's easy to find ideal driver T-S parameters in a given box volume, or for a given F3 frequency (-3dB point).

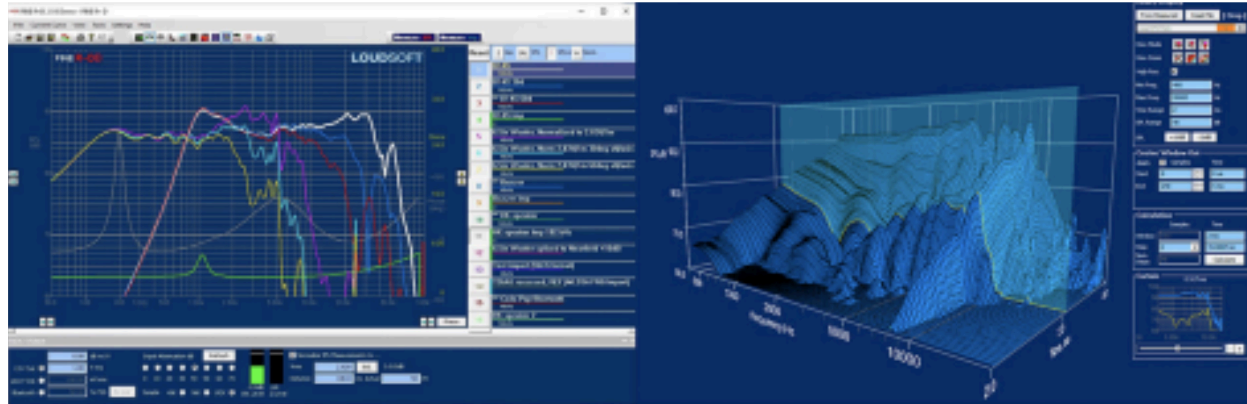


Valuable for all speaker and microspeaker applications, including in very large and small volumes and headphone rear cavities, FINEBox PRO software can simulate all types of car speaker systems. The latest version also adds simulations with accurate models of the Dinaburg C2S (Concentric Coplanar Stabilizer) technology.

We also need to mention the Loudsoft FINE X-over software, which is an ideal program for optimizing a loudspeaker system. A speaker designer can simply use the mouse-wheel to roll through standard E24 components and see the response including impedance and acoustical phase change immediately. The Intelligent Optimizer will find the best flat response while keeping the minimum impedance and calculating the real power in all components. The program also can import curves from FINE R+D and most other professional audio measurement systems and can work with up to seven on- and off-axis responses, which all can be optimized. The new RLC circuit means that users can tune both frequency, level using R, and Bandwidth BW. This is a quite powerful feature for minimizing peaks. And by applying thin wire to the inductor, the series resistance can be included in L.



With the Loudsoft FINE DSP software developed from FINE X-over, users can drag measurements directly from FINE R+D or CLIO, Klippel, Soundcheck, REW or any other system, and optimize on-axis and up to six off-axis responses with acoustical phase in real time.



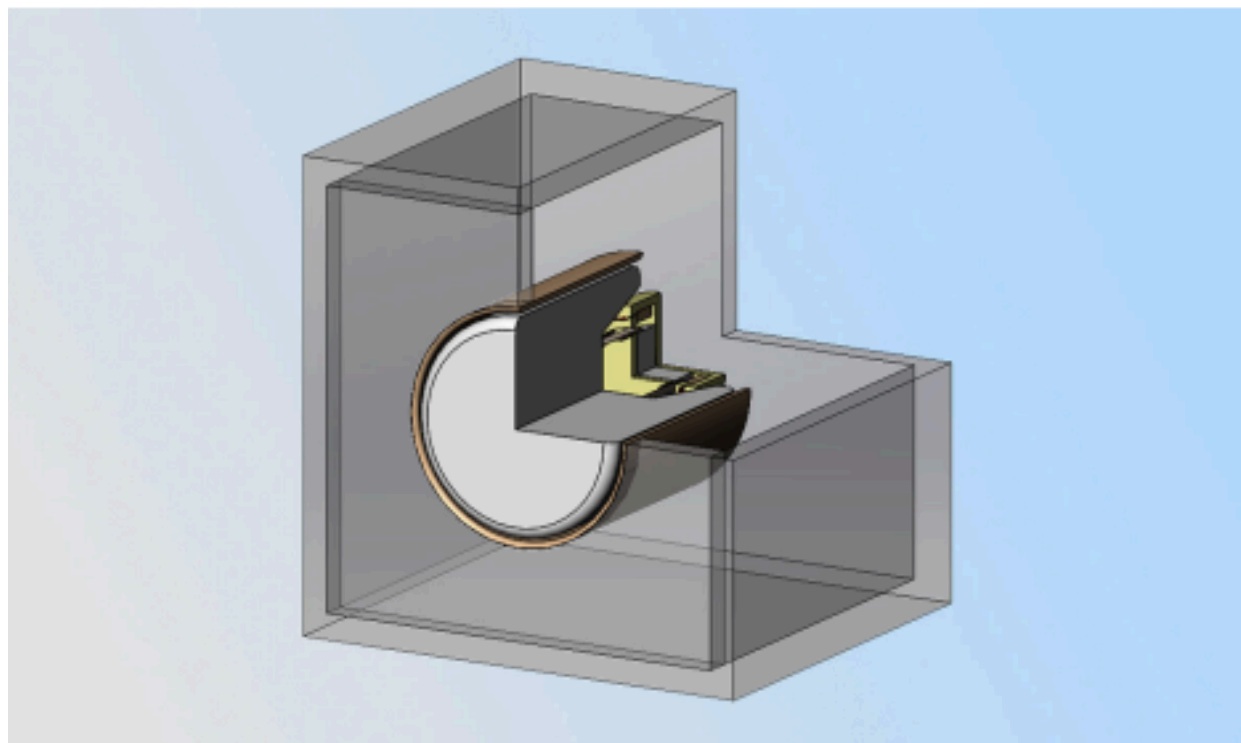
And this is the famous Loudsoft R&D and QC test instrumentation software suite. Not only is FINE R+D one of the most intuitive measuring systems for loudspeaker, headphone, and microspeakers, but Loudsoft also offers a popular production line QC test system that includes some of the best industry tools for those applications. And both FINE R+D and FINE QC work on both Loudsoft or ECHO hardware.

In the Works

There's always something in the works at Loudsoft. The image below is an example of a new concept that Peter Larsen is working on. This new subwoofer is built on a completely new principle. Instead of a traditional cone and surround + spider, this design has no spider or surround. Both are replaced by thin carbon fiber wires. Omitting the surround creates an opening, which here is transformed into a large bass reflex tube placed around a very deep solid cone. The sound is extremely open and free from the usual subwoofer distortion because there is no compression from the spider or surround. In addition, the air can move freely, causing less coloration of the sound.

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SUB 200 Subwoofer. A new patented surround-less, spider-less, subwoofer with frontal Reflex Port.



Dorit and Peter together with their daughter, VP of Sales Britt Larsen, at High End Munich, a trade show where they will return in May 2025.