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This year's ALMA (The International Loudspeaker Association) Winter Symposium was undoubtedly the best yet in a long series of interesting programs for loudspeaker engineers. Titled "Test and Measurement: What's the Buzz?" this year's program took place over two days, which gave the organization an opportunity to provide more information and convey more ideas regarding the current paradigm than any of the symposiums held previously.

Day one began with two excellent programs that, unfortunately, ran simultaneously, because attending both would have been ideal. The Transducer Test and Simulation Tutorials included an explication of all three of Peter Larsen's Loudsoft programs, FINEMotor, FINECone, and FINEBox; Listen Inc.'s Steve Temme's discussion of the measurement chain, microphone selection, types of test stimuli (stepped sine wave versus swept sine wave versus noise), evaluation of test enclosures and correlating lab results with production testing; plus Wolfgang Klippel's (Klippel GmbH) outstanding discussion, about understanding loudspeaker nonlinearities and the symptoms of each type of nonlinearity introduced into a transducer. This discussion also included the relevant artificial test signals (single tone, two-tone, multi-tone and program material).

At the same time, Steve Mowry presented an ALMA training program titled Fundamentals of Electrodynamic Transducer Design. Steve's discussion included a complete look at FEA modeling of motor structures, including magnetic BH curves for different materials, eddy currents, shorting rings (aluminum and copper), shielding, voice coil rest position, transducer modeling, thermal analysis plus a substantial discussion of hard and soft parts and adhesives. In short, if you missed this, you missed a lot!

Following the training and tutorial presentations was the afternoon Xmax panel discussion, which included Wolfgang Klippel, Earl Geddes, Dave Clark and David Prince. Unfortunately, Alex Voishvillo was unable to attend as scheduled. The discussion primarily focused on abuse of the term Xmax in industry literature, leaving consumers with the idea that Xmax somehow relates directly to performance, an oversimplification that has little meaning. While the panel generally recognized that there may perhaps be a need for a modified definition, there was no consensus on what that should be.

Since over excursion, running out of "Xmax," relates to distortion, Dr. Geddes shared information about his recent study, which points out that there is no correlation between listener preference and distortion. Given this, Xmax becomes less of a goblin, according to Dr. Geddes. He did, however, promise that a measurement system that does correlate with listener preference is in the works.

This year's symposium also featured a good spectrum of exhibitors, including:

- Advanced Elastomer Systems (www.santoprene.com)—makers of Santoprene;
- Audio Amateur Inc. (www.audioXpress.com)—Voice Coil, audioXpress;
- Bang & Olufsen Ice Power (www.icepower.bang-olugsen.dk)—Class-D amplifiers. (Ice Power exhibited a new line of amplifiers in conjunction with Sanyo.);
- Centrotec Composites GmbH (www.centrotec.de)—German exotic cone maker;
- Chi-Yih Enterprises Co., LTD. (www.chiyih.com)—China cone manufacturer that exhibited some new cones with injection-molded surrounds molded to the cones (both foamed and non-foamed Santoprene);
- Dai-Ichi (www.daichi.ph)—Philippine/China based OEM driver manufacturer;
- Dupont (www.kapton.com)—Kapton supplier;
- Ferrotech Corporation (www.ferrotec.com)—magnetic fluid manufacturer;
- G.R.A.S. Sound and Vibrations (www.gras.us)—measurement microphone manufacturer;
- Henkel Loctite Corporation (www.loctite.com)—adhesive manufacturer;
- Klippel GmbH (www.klippel.de)—makers of the Klippel large signal analyzer (also exhibiting a new test fixture for calculating spider and passive radiator compliance, called the Suspension Part Measurement Set);
- Listen Inc. (www.listeninc.com)—QC test equipment;
- LOUDSOFT (www.loudsoft.com)—loudspeaker CAD software;
- Menlo Scientific Ltd.—hosts of the Loudspeaker University programs (next Loudspeaker University is scheduled for April 14-17, 2004, in Nashua, N.H., www.loudspeakeruniversity.com);
- Nike IHM Inc. (www.nike.com)—exhibited new high-stiffness poly blend;
- NTI (www.nt-instruments)—maker of analyzers and measurement microphones;

- Nucore Inc.—exhibited a new type of self-damped inductor;
- NuWay Speaker Products, Inc. (www.nuway-speaker.com)—cone and spider manufacturer;
- Q Wireless, L.L.C. (www.qwireless.com)—manufacturer of "hi-fi" wireless products;
- Waves, LTD. (www.waves.com)—manufacturer of "missing fundamental" bass enhancement system (both IC and algorithm).

Day two included a series of technical papers presented by the following companies:

- High Order Harmonic Signature Analysis for Loudspeaker Defect Detection, by Dan Foley, Listen Inc.—discussed the use of ultra-high harmonics (10th–20th or 31st–40th) to detect loose particles in a driver gap;
- A Concurrent Approach to Transducer and System Development Projects, by Steve Mowry, S.M. Audio Engineering—an explication on OEM loudspeaker project management and manufacturing engineering focused on continuous improvement;

- A Reliable Solution for Rub Detection—the Last Challenge of Driver QC, by Tomas Minter, NTI Americas—discussed a time domain rub and buzz detection system;
- Loose Particle Detection in Loudspeakers, by Steve Temme, Listen, Inc.—covered the use of Time-Frequency maps to detect rub and buzz faults;
- Nonlinearity in Horn Drivers and Practical Aspects of Horn Driver Design, by Alex Voishvillo, Gibson Labs—(unfortunately, Alex was unable to attend, however, Dr. Earl Geddes took over, using Mr. Voishvillo's presentation notes) discussed the nonlinear effects in the compression chamber, phasing plug, and the horn throat;
- A New Measurement Technique for Rub and Buzz and other Nonlinear Distortion, by Wolfgang Klippel, Klippel GmbH—discussed a new type of rub and buzz detection methodology using the measurement of signal distortion in the time domain that exploits both phase and amplitude information;
- The Revolutionary Co-linear Self-Damped Inductor and its Application in Loudspeakers, by Chris Huston (Nucore Inc.) and Chris Gardner (Tessaract Audio)—discussed Nucore's primary thesis that phase distortion in loudspeaker crossovers significantly degrades sound quality, use of the Nucore inductor to improve phase distortion in networks, and comparison of two identical loudspeakers, one with Nucore inductors and one without (unfortunately, the network topography was also different, making true comparison limited to the effect of the inductor difficult).

This was definitely one of the most successful ALMA Symposiums to date. If you did not attend or are not a member of ALMA, I highly encourage you to plan to attend the next symposium and to consider joining this worthwhile organization. For more on membership, visit the ALMA website at www.almainternational.org.

Watch for more information on next year's Symposium, including a Call for Papers. We are happy to announce that next year's program will include a Manufacturers Roundtable Discussion. Watch www.almainternational.org for updates .