Loudspeaker Component Measurements

Suspension Part Measurement (spiders, surrounds, cones)

Suspension Part Measurement features a dynamic identification of the small and large signal spider parameters (Force deflection curve, Stiffness curve, resonance, damping factor…) using an audio like ac-stimulus. This measurement can also be performed as an accelerated life test for separating fatigue from break-in and assessing the long term stability of the suspension. (Figure 2)

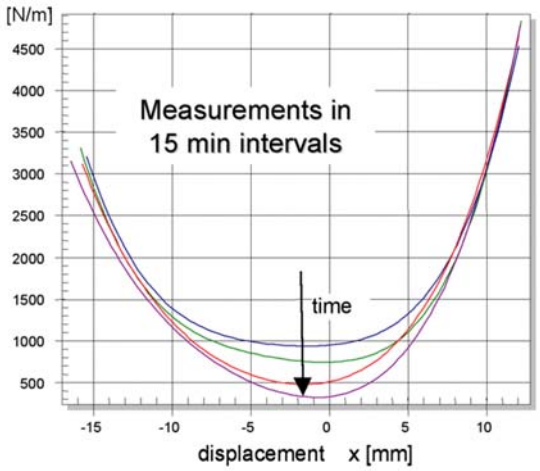

Figure 1: Suspension stiffness versus voice coil displacement and time

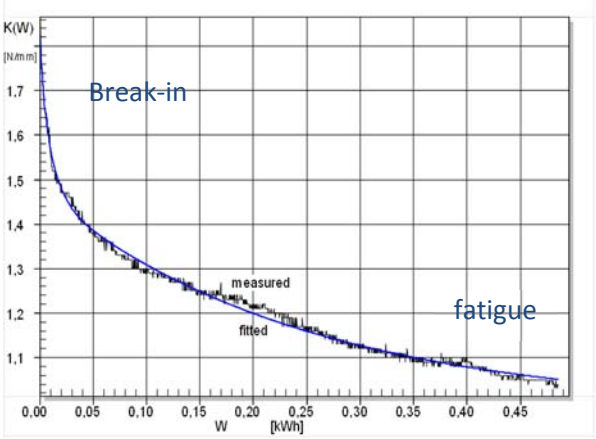

Figure 2: Stiffness versus apparent mechanical work applied to suspension of life time

Linear Suspension Part Testing for QC (spiders, surrounds, cones)

The QC LST is dedicated to the quality control of suspension parts (spiders, cones, surrounds) and passive radiators (drones). Linear mechanical parameters like resonance frequency, stiffness (LST Lite) or relative mass and stiffness deviation (LST Pro) are determined dynamically. The device under test is stimulated pneumatically while displacement is measured by a cost effective laser.
The fast loading mechanism is designed to change DUTs as fast as possible while ensuring stable and robust measurement conditions. For quality control limits can be calculated based on reference units to provide pass/fail verdicts.

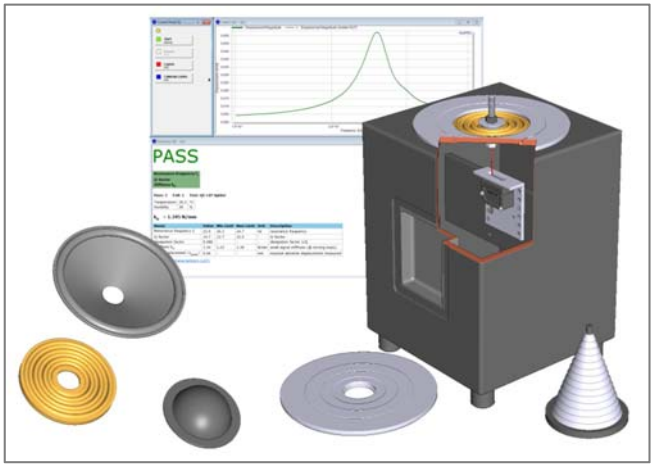

Figure 3: Production Check for Cones, Spiders, Passive Radiators

Cone vibration: Scanning Vibrometer System

The SCN Vibrometer measures the vibration and geometry of radiators, enclosures and mechanical structures used in loudspeakers, micro-speakers, headphones and other electro-acoustical or electro-mechanical transducers.
The SCN Analysis Software performs visualization, animation and a modal analysis of the mechanical vibration using the scanned data which is provided by the vibrometer.

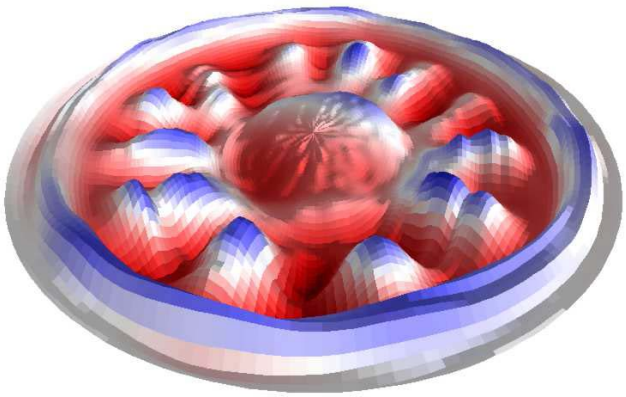

Figure 4: Breakup modes on a Loudspeaker cone

Voice coil temperature monitoring: Power Test System

A fast and reliable measurement of the instantaneous voice coil temperature of woofer, tweeter, micro-speakers and active systems can be realized by using a small ac pilot tone added to the stimulus. This technique reveals the thermal dynamics (heating and cooling process) of voice coils with a small or large thermal capacity.

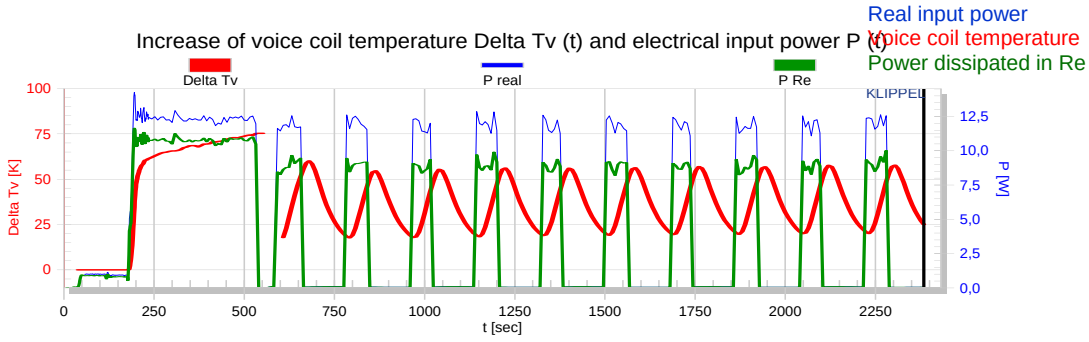

Figure 5: Power and temperature monitoring

Material Parameter Measurement (flat samples)

After cutting 1 cm strip from a flat sample the E-Modulus and loss factor is measured by a modified beam technique (ASTM E 756-93) using a loudspeaker for acoustical excitation. This can be applied to almost any raw material used in loudspeaker design (paper, thin foils, foam) and is the basis for communication between loudspeaker design and soft part manufacturing.

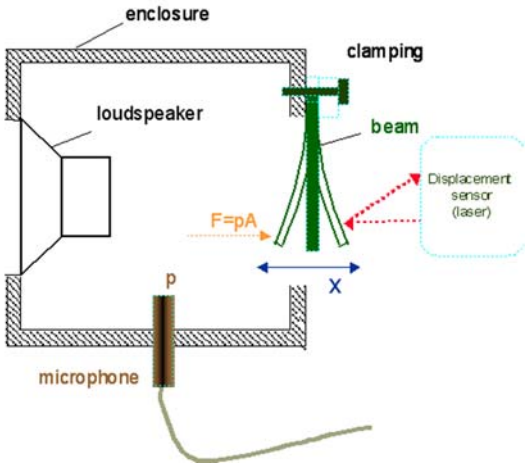

Figure 6: Principle of material parameter measurement

Measurement of magnetic Flux density (B Field Scanner)

The flux density B(phi,z) in the gap is automatically measured versus angle phi and height z by using a B-Field Probe and a mechanical scanning technique. This technique is the basis for predicting the force factor Bl(x) and for detecting problems in the design, assembling and magnetization causing rocking modes and voice coil rubbing.

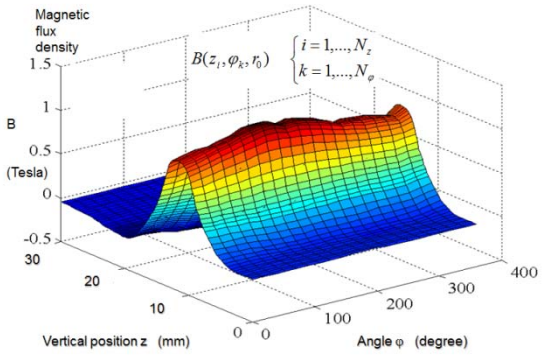

Figure 7: Measurement Results

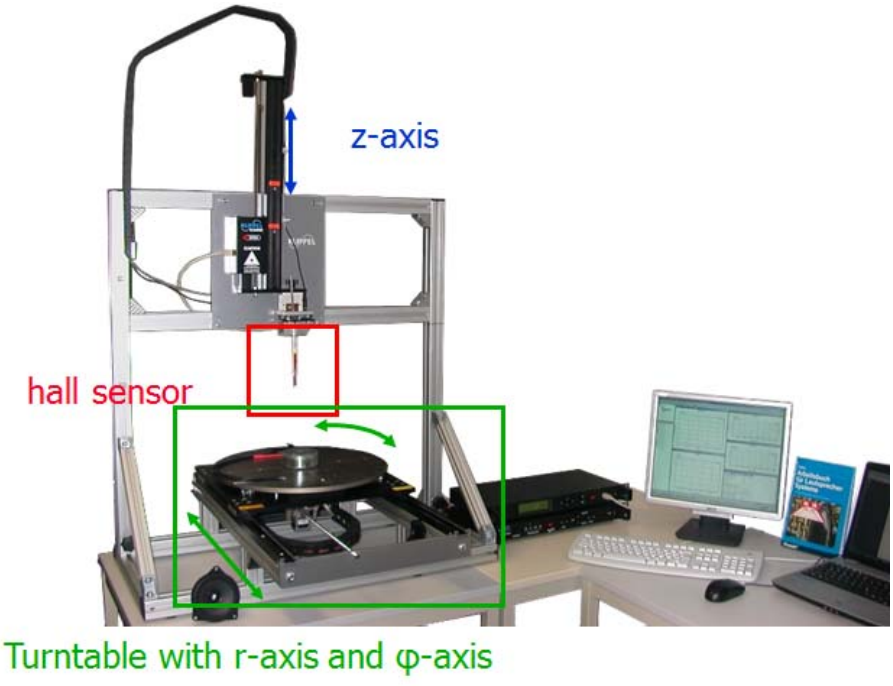

Figure 8: Setup