

Discovered: A quiet type with great potential

***Weinheim, 20th May 2010:** Vibracoustic identifies new potential on rubber-metal mounts with a particularly broad vibration-isolating frequency range. The **quiettype** effect provides not only savings potentials for customers, but is also paving the way to vibration control solutions for alternative drives.*

Vibration control components isolate sounds and vibrations triggered by the effects of dynamic forces inside the drive, engine, chassis or suspension. A special feature of such vibration control components is stiffness. Static stiffness exerts its effects when supporting a constant load (e.g. the engine mounts are pressed by the engine weight). Dynamic stiffness acts in conjunction with dynamic forces like those arising, for example, during the engine's internal combustion process. The behavior of rubber as a material causes dynamic stiffness to be higher than static stiffness. Consequently, the suspension will harden under dynamic loads and lose part of its isolating capacity. Noises and vibrations may penetrate into the passenger compartment and affect driving comfort.

Vibracoustic engineers have now been able to resolve the dilemma of reduced isolation under the effects of dynamic forces by lowering dynamic stiffness over a wide frequency range below the level of static stiffness. Dr. Hendrik Sell, Acoustics and Vehicle Testing Manager at Vibracoustic, explains: "Reduced dynamic stiffness prevents the rubber spring of the component from hardening. The rubber material will therefore retain its insulating softness, thus leading to a dramatic reduction in dynamic stiffness over a wide frequency range of even several 100Hz. Structure-borne sounds are isolated in the best possible way, while preventing the emission of any interfering sounds inside the vehicle."

This discovery is being translated into practice by Vibracoustic in a targeted way with immediate effect on rear-axle gear mounts, among others, to isolate any gear whining sounds from arising on the rear axle. It is particularly interesting to note that the very good structure-borne sound isolation on the mounts makes it possible for the source to become a bit more "noisy". This possibly means, for example, that a lower tooth quality inside the rear axle differential may be selected for the drive train. As a result, automotive manufacturers can save costs incurred for drive trains.

Pathbreaking applications are rooted in the reduction of structure-borne sounds exhibiting higher frequencies, as it is required, for example, on engine mounts for electric drives and the power electronics they include. Power electronic components generate new, electronically-driven noises which can be perceived much more clearly due to the elimination of the internal combustion engine. Otherwise, the passengers' nerves would be seriously frayed by tonal sounds.

Sell insists: „We are just beginning now to apply our findings to the various vibration control sectors involved. The potential for enhancement of structure-borne sound isolation remains very high on purely passive rubber-metal mounts.”

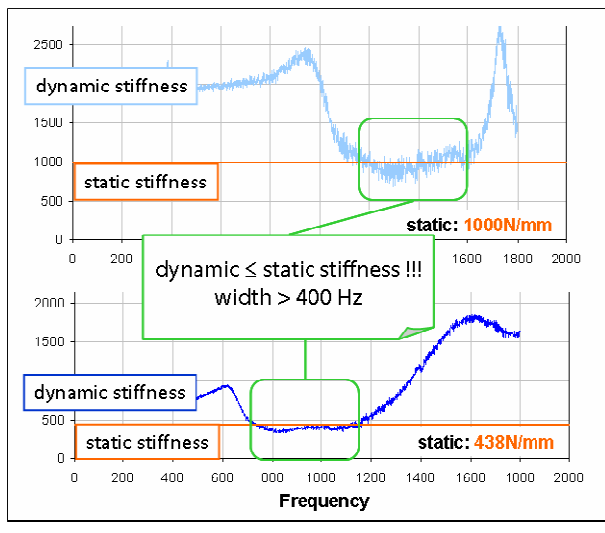


Figure 1 shows a measurement of stiffness progression running below or level with static stiffness over a width of 400Hz.

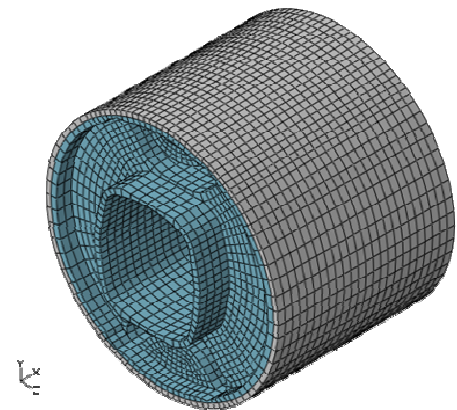


Figure 2: FEM model of the rear-axle gear mount with quiet-type effect

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Vibracoustic, a company of the Freudenberg Group, generated a turnover of 680 million € with 32 locations and 4500 employees in 2009. “We convert noise and vibration into sound and comfort”. This claim is based on substantial system competence, a comprehensive product and service program and a global network of development and production facilities. Vibracoustic solutions are supplied to all leading automotive manufacturers.