Vibracoustic

Press Release

Vibracoustic's breakthrough air suspension delivers optimal NVH and dynamics for Audi e-tron GT

Weinheim, March 19, 2024 | Vibracoustic redefines comfort and driving dynamics with advanced three-chamber air springs built in the Audi e-tron GT. The air springs use a complex design with build in safety features and silent valve switching for the air chambers, all while securing comfort and driving dynamics.

High-performance battery electric vehicles (BEVs) pose a number of significant challenges to automotive manufacturers. To give the vehicle useful range, large batteries must be introduced, and the resulting weight can have a negative impact on driving dynamics. In addition, the quiet running of BEV powertrains means that drivers and occupants can more easily detect mechanical noises and vibrations. One of Vibracoustic's solutions is the advanced three chamber air springs, which is built in the Audi e-tron GT. The air springs provide high ride comfort and dynamic performance while also protecting the battery.

Sleek and lightweight design and production

The sleek design of performance vehicles often leads to tight packaging, making it difficult to achieve the required volume within the air springs, which is directly related to comfort. To tackle this, Vibracoustic's engineers designed an intricate solution, comprising four plastic components, produced using an innovative Hot Gas Welding process, which is instrumental in enabling complex thermoplastic component manufacturing, without compromising component strength or stability. This allowed the solution to achieve the required performance and NVH characteristics. Furthermore, battery safety is another focus area, typical for BEVs, which was supported by the suitable solution design. Through the integration of innovative 'plugs' in the design of the part, the suspension strut is prevented from impacting the battery pack in an event of a crash.

Furthermore, the near-silent running of electric drivetrains presented another challenge for Vibracoustic's engineers who had to tackle the more perceivable noises from the switching valves within the air springs, particularly for the rear axle where the spring is closer to the cabin. To address this, the relative position of the valves within the air spring were taken into consideration, with a different solution for the front and rear.

Three air volume chambers for four different stiffness levels

Vibracoustic's three-chamber air spring has three switchable air volumes, allowing it to produce four different stiffness rates depending on the driving situation, which is directly related to the comfort and driving experiences. The more chambers are activated, the lower the stiffness is and the higher the comfort. The air springs can switch between four modes, ranging from a comfortable mode, using all chambers' volume to a very dynamic mode, using the smallest volume, for which the stiffness more than doubles. The system also utilizes body and wheel acceleration sensors to enable individual damper control at each axle, adjusting according to driver input, road conditions, and the road surface. This means that the Audi e-tron GT's suspension can be altered 'on the fly' during cornering, braking, and acceleration to minimize roll and pitch movements. The system can also adjust its height based on the driving situation and speed, moving between a total range of 60mm.

Dr Jörg Böcking, CTO at Vibracoustic, commented: "The development of high-performance BEVs requires engineers to balance dynamic performance, comfort, safety, and superior NVH within a single solution. Leveraging our deep technical expertise and innovative 'whole vehicle' approach to air suspension and NVH design, we were able to provide the best of both worlds – comfort and performance. It is another example of how Vibracoustic works proactively alongside its OEM customers to deliver practical and exciting solutions that define the future of mobility."

About Vibracoustic

Vibracoustic is a leading global automotive NVH expert, providing customized solutions adding comfort and supporting efficiency, safety and durability. Its expertise along the entire product life cycle and all vehicle systems as well as its broad product range enable Vibracoustic to solve current and future NVH challenges across all automotive segments. With around 12,000 employees at 40 production

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and engineering locations across 17 countries, Vibracoustic serves all major automotive manufacturers. In 2022 Vibracoustic recorded total sales of 2.5 billion €. For more information, see www.vibracoustic.com