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Review On Squeak, Buzz And Rattle Sound Detection By Using Test Track And Four Posture Mechanism.

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ABSTRACT

In the world of Buzz, Squeak and rattle testing, there is a high level of sophistication regarding the test machines employed to excite the items under test as well as the techniques used to ensure that the test is representative of real – life operating conditions.However, the object of the measurements, i.e., the identification of transient acoustic events classified as Buzz, Squeak and Rattle, is mostly a subjective procedure with classification in terms of sound Pressure level in dB (A) or stationary loudness.These " standard" metrics have proven, in general, unreliable in assessing the importance of individual transient events, and inappropriate to describe the vehicle signature from a BSR stand point. This report presents a methodology that has been developed for the BSR test of a vehicle using a road simulator to:

1. ***Demonstrate the feasibility of an automated system of detection of BSR events that can be replace the "subjective" detection.***
2. ***To establish "vehicle BSR" indices that can be used to assess design targets and specifications.***

The noise generated from the vehicle need to be tested before the delivery to the customer. This noise creation has been taken into study and focus is made for its reduction because at body level of vehicle. The process change in manufacturing has considerably impacted on noise reduction. This has led to decreasing noise levels in vehicle.

1.INTRODUCTION:

In recent years, with the improvement of the acoustic quality of the vehicles and engines, other types of noises that normally were hidden by the usual noise of the engine and the rolling noise are now perceived by the occupants. Some of the most annoying ones are the small noises coming from the squeak and rattle of the interior trimmings, which in general have become an indicator of the quality and durability of the product. The elastic deformation of the surfaces in accumulates energy and this is released when the static friction overcomes the kinetic friction producing then an audible noise. The generation of this noises occurs at low frequencies (under 200Hz) they are normally induced by energy input coming from the suspension system; however the release of the elastic energy produces the vibration of the adjacent surfaces causing contact audible noises in the range of 200 to10000Hz.

For prevention of BSR from vehicle cabin it is necessary to conduct the BSR test by which we can understand the location and type of noise.

Testing procedure of BSR is classified in two ways i.e. Rope track method (primary). Four posture mechanism with on road simulation (secondary). By using this methods BSR score is calculated based on type of noise generation (severity), frequency of noise generation (occurrence) and prediction about control (detection).

1.1 Rope Track Method:

Rope track is the method to indentified noise inside the vehicle after fitment of all parts before shower testing. This testing should be done by the production department before vehicle checked for BSR test. Each and every vehicle should check on rope track so that any mistake done by the worker/operator regarding the generation of noise can identified. So it is easy to take corrective action for noise generation

1.2Four Posture Mechanism With On Road Simulation:

Fig.1.2.1Four Posture Mechanism

This is more accurate method of obtaining the noise generation data which is not gained by previous one. In this method, vehicle is mounted on four posture mechanism with support is only provided to the tyers and vehicle vibrates with different frequencies of oscillation through suspension only. For such type of testing specific norms/criteria should be followed by test engineer like all the doors of vehicle should be closed, engine should be switch off mode, there should not be any loose parts inside the cabin while testing.With the help of these two testing methods we get main location from where the noise is generated and this problem can be solved.

2.TESTING OF AUTOMOBILE

Its probably reasonable to expect that most customers would consider a squeak or rattle on a relatively smooth road for more annoying than one found on a rough road. Roads and driving habits vary from customer to customer, vehicle to vehicle, region of country and country to country. To perform a reasonable squeak and rattle performance assessment, finding all the issues a critical customer would complain about, without finding many that no customer would complain about, it is important to select the right road inputs and driving conditions. Some countries in Europe still have cobblestone and Belgian block type roads. Mexico has stone roads, even in some expensive residential areas. The stone can be up to about 5 inches in diameter with about 2 inches of exposed stone protruding from the surface. Shanghai, china has some concrete roads with fine ridges running across the road

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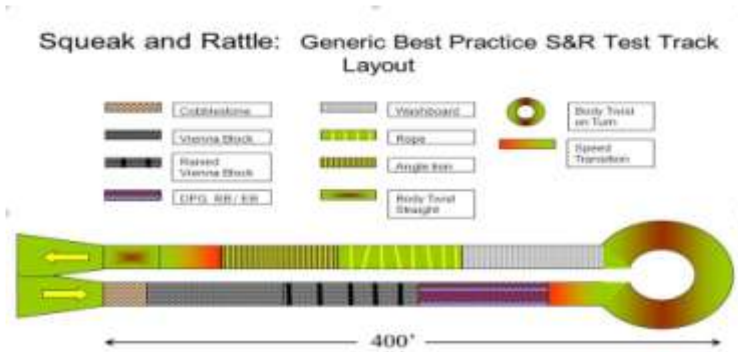

Fig.2.1 Testing of automible

2.1 Structural Integrity

As relative motions cause S&R, minimizing them effectively controls S&R. By using smarter structural design, S&R can be heavily reduced. Reduced S&R warranty bills can easily offset the initial cost of method development and implementation. Superior structural integrity implies adequate static and dynamic stiffness, both global and local. Stiffer is generally better but too stiff is also too expensive and too heavy. Superior dynamic stiffness needs to go hand in glove with adequate modal alignment and mode shape continuity. Over the last several years, the focus on vibration management has been directed toward modal-alignment strategies. Using the resonant frequency of a vehicle structure or component as a parameter to measure NVH quality of a vehicle has proven to be valuable in many structural NVH issues including S&R. The focus has been to isolate modal frequencies and minimize interaction and excitation.

2.2 Superior Material Friction Pairs

Since some relative motion is always anticipated, the judicious selection of material mating pairs will reduce the occurrence of S&R. Squeaks, itches or creeks, are generally caused at elastomeric contact locations such as windshield and backlight headers, roof/door weather-strips, IP seals, etc. A fair amount of effort has been expended to find squeak-free elastomeric materials. Because of the tremendous number of entities involved in the generation of the squeak, no single material is the ultimate fix-all solution. Manufacturers have tried several 'slip-coatings' and surface finish textures on elastomeric materials but only with limited success resulting from problems with wear and atmospheric durability. Research in this field has gravitated towards finding effective material friction pairs that minimize squeaks. Engineers have determined the mechanism and sensitivity of vehicle components and systems to squeak. They also describe computational experiments with material pairs and how they correlate to friction data from experiments. Engineers further utilized a friction test apparatus to develop a polymeric material pairing database for use in automotive systems. They aim to integrate the database into the automotive component design process (CAD/CAM/CAE) so that potential concerns can be addressed prior to critical design milestone freeze dates.

2.3 'Smart' Design

A smart design consists of several incremental factors that can provide effective solutions to niggling S&R issues. Several smart design practices are employed because of poor experiences in past models. Often, design engineers compromise S&R over aesthetics when indeed a mutually acceptable solution is possible. A database of S&R Lessons Learned as well as one of effective Competitor S&R Solutions can prove invaluable to design engineers. Attention to small details pays high dividends in the S&R arena.Certain shapes, especially those used in door system and IP trim, afford effective acoustic amplification resulting from multiple reflections. Other materials provide 'hard' acoustic reflection

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surfaces. Often, minimal sound damping surface treatments are effective at minimizing acoustic radiation and amplification. Sound barrier materials, placed cleverly between the source and receiver are beginning to be employed at several levels.

Other basic solutions must be borne in mind. Major structural members must be adequately supported. Component masses should be attached to major structural members. This was previously discussed with respect to an IP. Fasteners should be evenly and cleverly distributed. For example, a fastener for the IP substrate is more effective near a component rather than away from it. Adequate numbers of fasteners must be provided where required. Felt tape is known to be highly effective at S&R hot spots. Although the structural integrity of the component/subsystem may be adequate, felt tapes at historic hot spots effectively guard against environmentally related dimensional variations. Clips used to fasten trim on the IP are historic S&R hot spots.

3.CONCLUSION:

Squeaks and rattle are very difficult to detect in the presence of background noise. Novel signal analysis scheme in the time-frequency domain are being increasingly adopted. In the future, squeaks and rattle could possibly be extracted using sound recognition schemes from a pre-established database of S&R noises, utilizing neutral networks. The need for a robust metric for S&R evaluations has been evident for some time. Because of the stochastic nature of S&R, the formulation of one has not been easily possible. Engineers introduced the concept of the relative approach to evaluate S&R but further work is needed to develop an effective S&R metric.

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