Experimental and model analysis of car roof incorporating with different shape viscoelastic damper

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Abstract

Car Roof is vital component in the passenger car .outside obstacles they not only provides safety against Which are disturbing passengers And driver and also it gives supports against the wind. It also offers aerodynamic effects in motion. Car roof will vibrate due to wind force and by the less weak reinforcement, this can be overcome by adding the some damping element. The experimental modal analysis was carried out with and without dampers for the roof and the validation of results was carried out.

1. INTRODUCTION

- vehicles which produce less Noise and Vibrations by its body panels. The Noise, Vibration & Harshness (NVH) generated by the vehicle for many more reasons such as rpm of the engine and road surface conditions. Automotive industries are more concerned to improve NVH performance, and spending millions of dollars on it.
- Noise, vibration and harshness generally termed as NVH, deals with the objectives and subjective structural dynamic and acoustic aspects of automobile design. The NVH engineer deals with the structural dynamic response of the vehicle from the complete assembled system down to the normal modes of the individual components.
- Whenever vehicle is in motion it experience stochastic, time varying input important for safety, quality and comfort of the passenger. Majority of the new design processes concerning throughout the design involves combination of extensive modelling, simulation, evaluation and optimizations techniques. This ensures the both noise and vibration comfort. Developing and/or modification of old materials and techniques but viscoelastic damping is a smoother, cheaper and more effective way for improving NVH.
- Mechanical dampers are now widely used for vibration control of stay cables. They are regularly installed close to cable lower anchorage connecting cable to bridge deck with a support. For short cables, they might be installed inside the cable guide pipe, called internal dampers as compared to external dampers with a support.

2. Objective

- Understand the effect of topology optimization to maximize the damping effect subject to constraint on maximum allowable volume of damping material.
- Modeling of exist sheet metal structures of a car roof in CATIA V5 software.
- Modal and Harmonic analysis of sheet metal structures by using ANSYS 19 software.
- To manufacturing of optimized sheet metal structures of an car roof.
- To perform experimental testing of existing and optimized model of optimized sheet metal structures using FFT and impact hammer test.
- Experimental testing and correlating results.

3. Conclusion From literature review

The sheet metal structures (Canopy) used in DG sets is mostly susceptible subjected to the various static and dynamic loads during their oscillation cycles. Due to this, they encountered resonance condition at various operating frequencies. Resonance leads to harmonic excitation which further introduces the deformation and stresses leading to the failures of sheet metal structures.

4. Methodology

Step 1: - I started the work of this project with literature survey. I gathered many research papers which are relevant to this topic. After going through these papers, we learnt car roof part subjected vibrations.

Step2: - After that the car roof shape which is required for our project are decided.

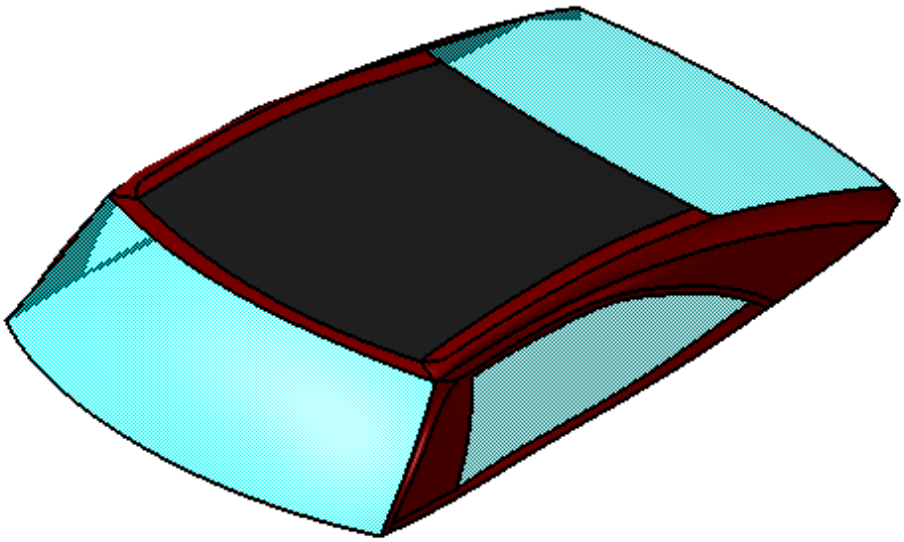
Step 3: - After deciding the components, the 3D Model and drafting will be done with the help of CATIA software.

Step 4: - The Analysis of the car roof will be done with the help of ANSYS using FEA.

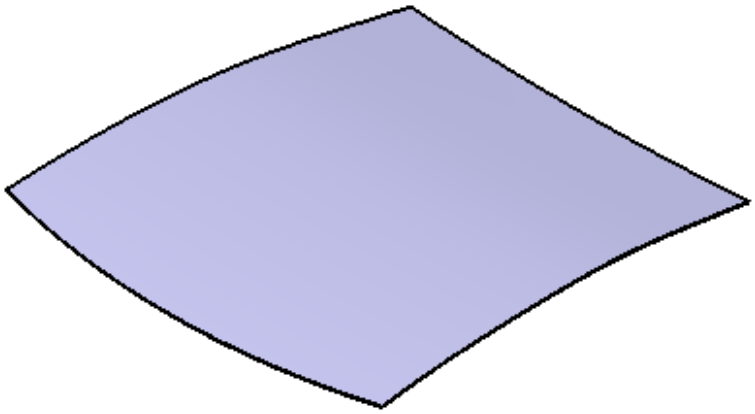
Step 5: - The Experimental Testing will be carried out with the help of FFT analyzer.

Step 6: - Comparative analysis between the experimental & analysis result will be done and then the result & conclusion will be drawn.

5. Concept of Model



6. Roof Cad Model



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