Design High Frequency Noise Test Fxturing for Viscous Mount Characterization

Overview
LORD’s cab viscous mounts provide customers with a cost effective high performance solution to excessive vibration, unwanted cab noise and displacement for the industrial marketplace. By design, each viscous mount consists of an elastomer and viscous element that can be tuned to achieve the highest degree of performance for any given application. Throughout testing, it was noted at higher frequencies LORD has a need to evaluate the viscous mounts response characteristics in order to better understand the cabin environment. The project is centered on this need.

Objectives
The projects scope will involve brainstorming of ideas and executing the design of a high frequency test fixture for viscous mount benchmarking on a shaker as well as the evaluation and development of a viscous mount test plan. This test fixture will need to be designed in a manner to ensure the proper axial pre-load (approximately 550 lbf), limit fixture excitation at frequencies in an estimated range of 100-1000 Hz, as well as be interchangeable for testing both in the radial and axial direction.

Approach
- The team began by establishing specifically all of the customer needs and requirements.
- Benchmarking of existing products and researching related patents then took place.
- The team then researched vibration and natural frequencies.
- Vibratory FEA and a physical frequency sweep was performed on the original fixture to determine problem areas.
- Concept generation and selection then took place to determine a generalized final design that would be further pursued.
- CAD models were then created and tested via vibratory FEA to determine location of natural frequencies.
- Iterations and subsequent FEA testing were performed until a design was found that met all of the customer needs.

Outcomes
- An appropriate fixture design (CAD model) was created and verified via FEA.
- If the design is manufactured, LORD will be able to accurately characterize their cab mounts at high frequencies.