Nexteer Automotive-Load Road Simulator

David Huckins, Nathan Olin, Kenny Cordry, Brian Crombez, Claire Yarmak, Tianshu Wen and Pablo Parraga-Ramirez
Central Michigan University
Mt Pleasant, MI 48859

Abstract

Nexteer Automotive specializes in advanced steering and driveline systems. They are a global company that consists of twenty manufacturing plants, five regional engineering centers, nine customer service centers and three vehicle performance centers. Nexteer has assigned a task that involves designing a fixture for a road load simulator that is a vital tool to minimize down time testing the vibrations that occur within rack and pinion assemblies. This will be accomplished by designing and manufacturing a fixture that is subjected to an axial load developed by a moment arm oscillated by a shaker and attached to a steering rack tie-rod.

The fixture must be able to receive a maximum load of +/- 8000 N from a single rod that remains parallel to the ground while being able to attach a tie rod that is connected within a +/- 15-degree angle in the vertical and/or horizontal plane. This includes properly transmitting the load from the shaker through the fixture to the tie rod without loss of load through friction or improper dynamic application. The noise level and excessive vibration must be limited to the best of the design team's ability through the use of noise damping materials and innovative design. The material needs to be as light as possible while maintaining an acceptable strength to prevent failure. The design will be focused on meeting the customer's needs, functionality, cost, and manufacturability.