Evaluation and reduction of steering column vibration of a rear wheel drive sedan

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Abstract:

Vehicle noise, Vibration and Harshness (NVH) has become a key enabler for successful distinction between competitive vehicles because consumers have come to judge vehicle quality by NVH levels. One of many critical areas of NVH is the amount of vibration felt in the steering wheel as the customer drives the vehicle. This paper presents the evaluation of steering column vibration for a rear-wheel drive sports sedan. A significant amount of component level work had previously been done for the column under study, the results of which did not yield a complete understanding of in-vehicle response. For this follow-up study, a varying force input level test was designed to understand how this steering column responded under forces seen in both bedplate and in-vehicle testing. It appears that the column reacts in a non-linear fashion, and the forced response spectra changes with varying input force. The additional insight of the component response yielded greater understanding of the vehicle response. Transfer functions between key chassis attachment points and the response at the wheel were studied to understand the vehicle response and, where possible, to improve the column response. These investigations yielded significant understanding to component and vehicle weaknesses to arrive at improved designs. Significant improvements in tactile response were achieved by altering the vehicle chassis sensitivity to input loads.