

## **Optimisation of acoustical comfort in vehicle cabin using goal programming**

### **Abstract**

Car cabin acoustical comfort is one of the main features that may attract customers to purchase a new vehicle. The noise in a passenger car cabin is closely related to the vibration generated in the vehicle system. In this study, the effects of vibration on noise in the passenger car cabin have been studied. The vehicle acoustical comfort index (VACI) was used to evaluate the noise annoyance level and the vibration dose value (VDV) was used to evaluate the vibration level. Because engine noise is one of the dominant sources of interior noise, an approach has been used to study the correlation between engine speed and the level of generated vibration. According to the changes in the noise and the vibration level as a function of engine speed, a goal programming model was used to optimise the noise annoyance level in the passenger car cabin. At the end of the study, a multi-objective model was successfully built to optimise the noise annoyance levels by looking at the required vibration dose value at certain engine speeds.

### **Keywords**

Goal programming; Sound quality; VACI; Vehicle acoustical comfort index; Vibration