

Abstract

Squeal noise generated by the brake disc is a phenomenon that negatively affects the comfort of vehicle passengers. At vibrations of certain frequency, the brake disc can enter in resonance and act as a loudspeaker. The ability to produce brake discs with defined eigenfrequency is therefore crucial for controlling the brake system squeal.

Traditionally, gray cast iron (GCI) is the preferred material for automotive brake discs. Since the brake discs are produced in a casting process, variations of the microstructures of the material between discs are inevitable. This causes a significant number of discs don't fulfil the eigenfrequency requirements and are scraped. There is therefore a need to better understand the mechanism behind the variation in eigenfrequency of GCI brake discs.

This work has investigated how the shape, size and distribution of the cast iron microstructure elements affect the tendency to produce squeal. Data from several optical and scanning electron microscopes images as well as hardness measurements have been analyzed to determine relations between microstructure elements such as graphite, pearlite and MnS and the brake disc eigenfrequency.

This investigation showed a relation between eigenfrequency and microstructure parameters number of MnS particles/mm² and pearlite interlamellar spacing. Those two parameters are usable to predict the eigenfrequency of brake discs.