



**BRAKES**

# ENGINEERED SOLUTIONS

**Bulletin BES 05-02**

**Subject:** Brake Noise, Vibration, and Harshness

**Vehicle Involved:** All Vehicles

**Condition:** Brake noise caused by rotor composition

**Repair Procedure:** Install Rotors that meet or exceed OEM specifications.

The metallurgical properties of a rotor determine its strength, noise, wear, and braking characteristics. The casting process is carefully controlled when producing a high quality rotor. The rate at which the iron cools in the mold must be closely monitored to achieve the correct tensile strength, hardness and microstructure.

As iron cools the carbon atoms that are mixed in with it form flakes of graphite, which help dampen and quiet noise. If the iron cools too quickly, the particles of graphite don't have as much time to form and are much smaller in individual size, which makes for a noisy rotor. Damp iron rotors use more carbon to form large flakes that absorb more vibration.

The rate of cooling also affects the hardness of the rotor. If a rotor is too hard it will increase pad wear and noise. Hard rotors are also more likely to crack from thermal stress. Soft rotors wear faster and are more likely to warp and create a pulse in the brake pedal as a result.

The composition of the iron in a premium rotor is closely controlled during the casting process to keep out impurities that may form hard spots. The molten metal is poured through ceramic filters to trap contaminants. The sand that is used to form the mold is specially treated to control moisture; this helps prevent core shifts, and casting porosity.

