

Pedal Pulsation Caused by Moisture Buildup

Date: 01-28-20

Vehicles Involved: Disc Brake Vehicles

Condition: High-Speed Pedal Pulsation

We recently had a Ford Edge come into our shop with a complaint of high-speed pedal pulsation. The owner informed us that the vehicle didn't get used much and does a lot of sitting around in the elements.

A first quick look through the wheels didn't show any signs of concern. The rotor surfaces looked clean and smooth. The front brake pads showed plenty of life. However, once we took the wheels off and inspected the brakes, we quickly found the problem.

Pad and Caliper Inspection

After removing the caliper, we found that the inboard pad seized in the caliper on both front wheels. Excess moisture caused rust buildup in the caliper bracket. This rust wasn't as prominent on the outboard pad because it received consistent airflow through the wheels.

When looking at the life of the two pads, the outboard pad had plenty of life left on it (See Image 1). The inboard pad was almost worn down to the backing plate. Additionally, it had grooves on the friction surface (See Image 2).



Image 1

The excessive wear on the inboard pad was due to it seizing in the bracket. The pad was stuck in place up against the rotor, causing it to wear down at a quicker rate than the outboard pad.



Image 2

Rotor Inspection

Like the friction, the rotor surface told a different story when looking at the outboard versus the inboard. As mentioned, the outboard surface of the rotor looked fine. The surface was clean. There wasn't much if any rust buildup (See Image 3).



Image 3

However, the inboard side of the rotor was a mess. Rust buildup was prominent on the inboard surface. Additionally, the inboard was showing signs of a condition known as rust jacking (See Image 4). Rust jacking can occur on rotors when paired with ceramic friction. Ceramic brake pads leave a thin layer of material on the rotor's surface when applied.

When excess moisture builds up on the rotor's surface, it can creep under this friction layer. Over time the moisture will cause some of that material to pop off the rotor. This leads to an uneven surface on the rotor. This is otherwise known as a thickness variation.

This thickness variation caused the high-speed pulsation that brought the vehicle into our shop. Since the vehicle was sitting around in the Chicago elements with a lot of rain, snow and sleet, it makes sense that the moisture buildup would lead to this problem.



Image 4

Repair Procedure:

The first thing this condition illustrates is the importance of a thorough brake inspection. If we were to stop our inspection by looking through the wheels, we never would have identified the issue. It is important to inspect each part of the assembly to diagnose a problem in the brake system.

There are two steps we will take to prevent this problem in the future. First, we will put coated rotors on the vehicle. Coated rotors help protect against the damaging effects of rust and corrosion. The coating protects the edges of the rotor surface (See Image 5). This prevents moisture from creeping under the friction layer, which leads to rust jacking.

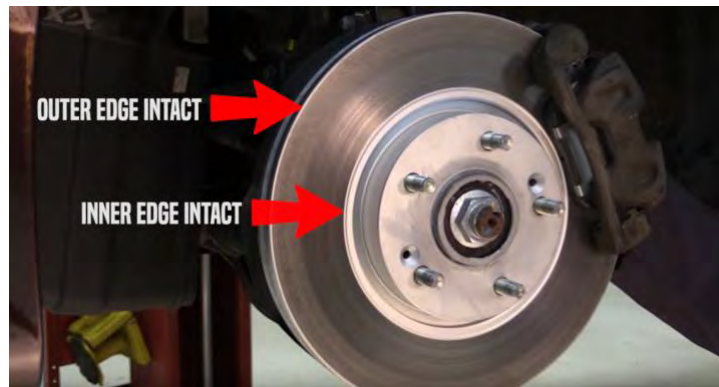


Image 5

Second, we will make sure to lubricate any metal-to-metal contact points in the system. This includes the areas where the pads contact the caliper bracket. This will prevent the pads from seizing in the caliper in the future.