

## Tips on Replacing Rotors

### Overview

The rotor is a cast-iron disc attached to the wheel hub of a car that provides a friction surface for the braking system. Rotors can warp from the heat, be gouged from worn brake pads, become pitted and rusty and can crack. When any of these conditions are present, the rotor must be reconditioned or replaced.

### Visual Inspection

To determine if a rotor is damaged, a visual inspection can be performed without removing it according to John Remling in his book, "Brakes." If the rotor is concealed by a shield, look between it and the rotor with a flashlight. Remling says to look for two things: cracks and scoring. Rotors with cracks need to be replaced. Scoring is the most obvious sign of wear and light scoring is usually not a problem.

Rotors should turn without excessive wobbling, which is called runout. Runout is caused by warping and twisting of the heat and pressures of braking, and, according to Remling, can be measured using a dial indicator, which measures in the thousandths of an inch.

Remove the wheel from the hub and all play from the wheel bearings and attach the dial indicator. Any runout that exceeds 0.0005 inch is considered excessive, according to Remling although different manufacturers have different specifications and the owner's manual for the vehicle in question should be consulted.

Other conditions to check are rotor parallelism, rotor thickness and taper variation. The inner and outer surfaces of a rotor must be parallel to each other, according to Remling. Any deficiencies in this area can cause vibration and pulsing when the brake pedal is pressed and rotors have to be either machined or replaced. Rotors have a minimum thickness recommended by the manufacturer. Rotors not meeting this requirement need to be replaced. Taper variation occurs when both surfaces of the rotor are not perfectly flat, according to Remling. Rotors with this condition can be machined or if the damage is excessive, should be replaced.

### Machining the Rotor

There are two methods for restoring a rotor: resurfacing and reconditioning.

Resurfacing is feasible when the rotor is rusty, lightly scored or covered in brake dust. Resurfacing grinds the rotor surfaces with a disc rotor grinder which uses replaceable abrasive disks. The grinder is attached to a rotor lathe and will smooth out minor imperfections, according to Remling.

Reconditioning is suggested for rotors that exhibit excessive runout, taper variation or deep scoring. The rotor is attached to a rotor grinder mounted on a lathe and cutting tools are used to remove the damaged surface of the rotor. This method is tricky, according to Remling because the specifications for rotors are critical and must be met. Always consult the manufacturer's specification sheets or replace the rotor entirely.

### Rotors Mounting Tips

James Walker, Jr., in his book "High-Performance Brake Systems," lists tips for mounting rotors properly. Be sure that the hub mounting face as well as the rotor itself—if the rotor has been reconditioned or resurfaced—is free of corrosion, deposits or other

debris by using a scouring pad to clean the surface. Scour the mating wheel face as well to make sure all areas are clean. Finally, when mounting the wheels, tighten the lug nuts in the manufacturer's recommended sequence, Walker says, and tighten them progressively to their appropriate torque. "Over-tightening is a guaranteed way to distort the rotor, which can ultimately result in unwanted brake vibration," Walker says.

Brakes; John Remling; 1983

High-Performance Brake Systems; James Walker, Jr.: 2007

Brake Handbook; Fred Puhn; 1985

Automotive Suspensions, Steering, Alignment and Brakes; Walter E. Billiet and Walter Alley; 1974