Preventing Pedal Pulsation with an On-Car Lathe

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Special thanks to Pro-Cut for the use of its lathe and for allowing us to use its facility at NASCAR Tech, Mooresville, N.C., to shoot this photo sequence.

In today's marketplace it seems that brake-pedal pulsation has overtaken noise as the most-common brake complaint. There are many possible causes, but really only one simple solution, provided all parts in the vehicle are good. The solution is to use an on-car lathe to machine the rotor in the plane in which it operates.

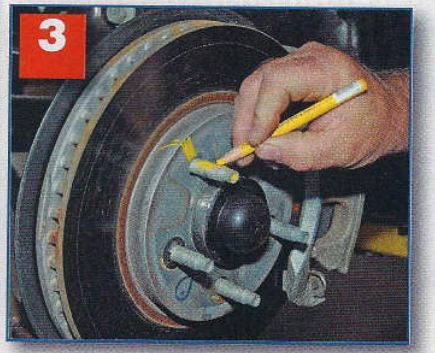
Certain preliminary steps and inspection procedures are required before a rotor is turned on the car. An on-car lathe will not compensate for inadequate or low-quality workmanship or not inspecting for problems such as rust buildup behind the rotor hat. If used properly, though, it will prevent pedal-pulsation comebacks.

A slight amount of runout in the rotor, hub and other rotating components will result in stacked tolerances that can cause a significant problem. A small amount of runout at the hub face will be multiplied many times at the outer edge of the rotor, so everything must rotate in the proper plane.

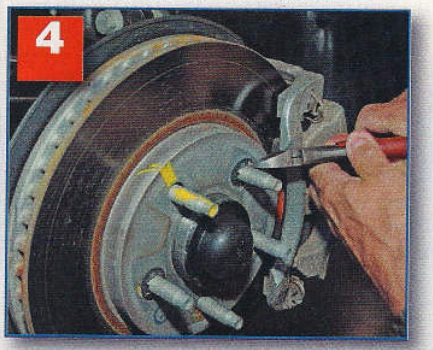
On-car rotor machining has been around for many years, but today it is easier, quicker and more efficient. It is the real solution to pedal pulsation. If you are having comebacks for pedal pulsation you should definitely consider an on-car lathe. In fact, if on-car machining is your primary method you will have virtually no problems with pedal pulsation. If the pads follow the rotor in the same plane you can actually end up with more-efficient braking and overall safer operation, although that's not the concern of most customers. They often are more concerned with the fact that the wheels shake and the pedal pulsates, and they sometimes get scared to death on high-speed stops when rotors have excessive runout.

Before doing any brake work to solve pedal pulsation, grasp the wheel and tire as shown and check for in-and-out movement. If there is a loose wheel bearing, machining the rotor on the car will not solve the problem.

Vehicles such as the new-style Ford Mustang have a factory recommendation of on-car rotor turning to prevent pedal pulsation.



Ford Motor Co. match-mounts rotors to hub faces. Mark the rotor, mark the stud and be sure to install the rotor at the same location to avoid causing a problem that was not there before.



You know that this rotor has never been off because the factory-installed retaining clips are still on it. Remove them. It is not necessary to reinstall them.

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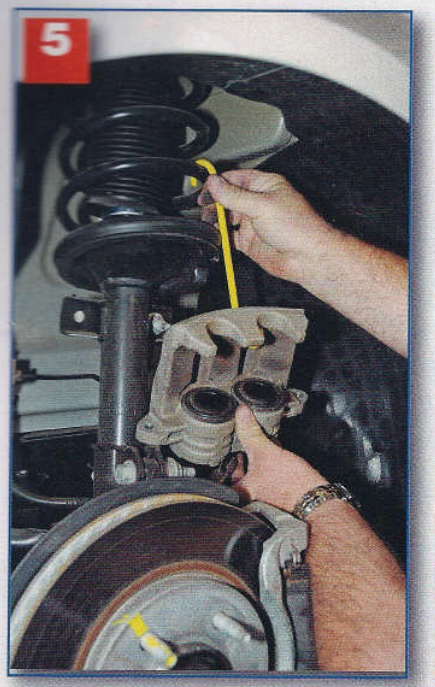
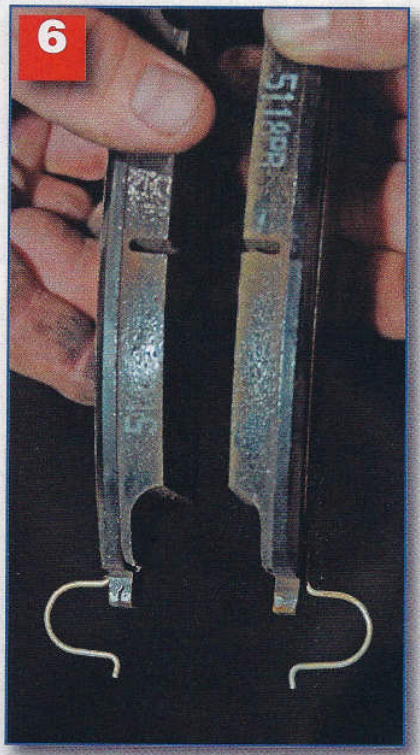
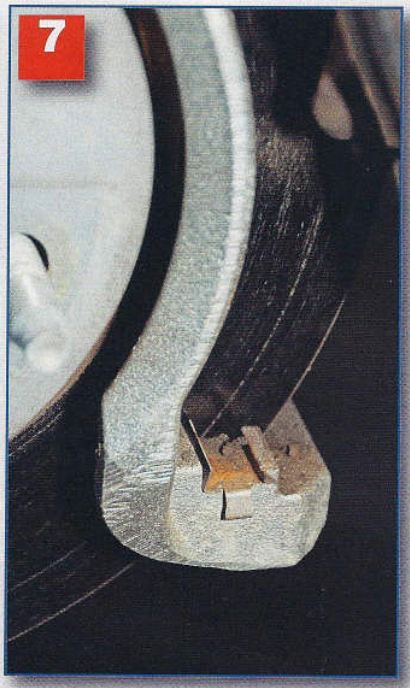


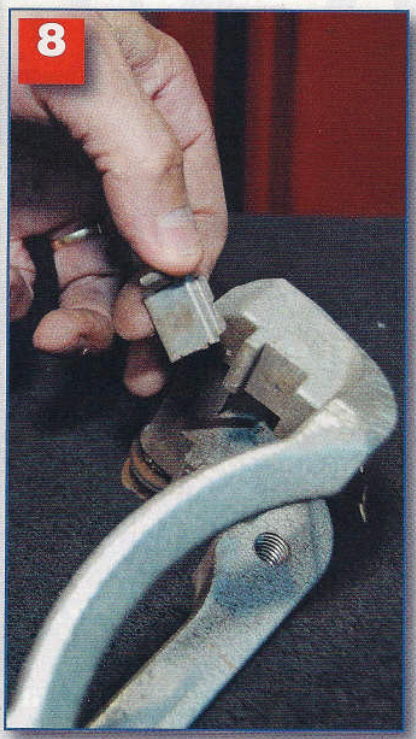
Use common sense and professional service procedures. Use a caliper hook to hang the caliper. Don't allow it to hang by the hose.



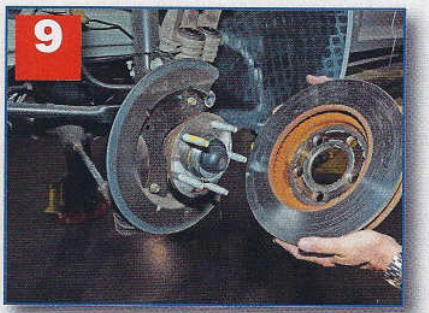
Check the pads for tapered wear, unusual sharp edges and more wear on one pad than the other, an indication of a slide problem. Don't just remove and discard them. Look at them to see what is going on.



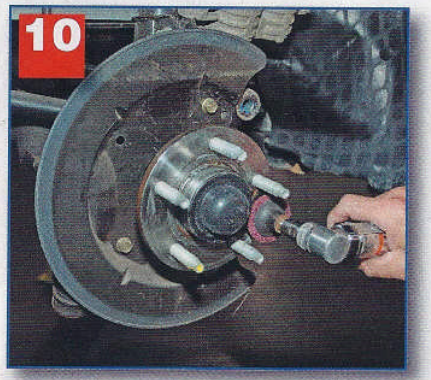
Note the beginning of rust and scale buildup on the pad side of this abutment clip. Also note that Ford does not lubricate the clips on Mustangs.



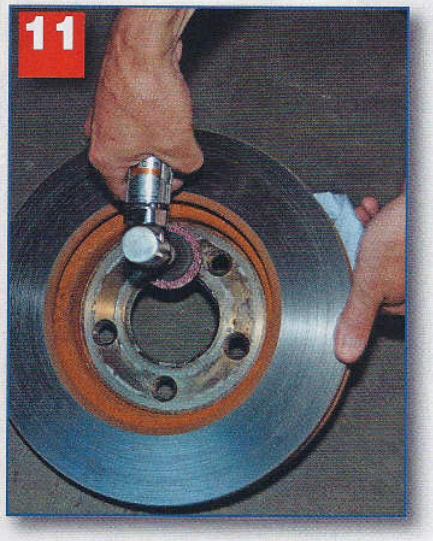
The coating on the back side of the clip is not allowing any rust or scale to build up, but the front side – where the raw steel pad contacts it – does have a buildup that can limit the pad's sliding action.



Lift the rotor from the hub and look at the back side. Ford commonly lubricates the contact area between the rotor and the hub. That was the case on this vehicle and there is no significant rust and scale buildup.



If there is any buildup use a Scotch-Brite type of cleaning pad or a special tool that fits over the stud to remove it. Rust and scale buildup in this area causes rust jacking that in turn causes a large amount of runout at the edge of the rotor.



Also be sure to clean the inside surface of the rotor. Do this even when no rust or scale is present, as the rotor tends to build up a rust lip on the area just outside the lubricated area.

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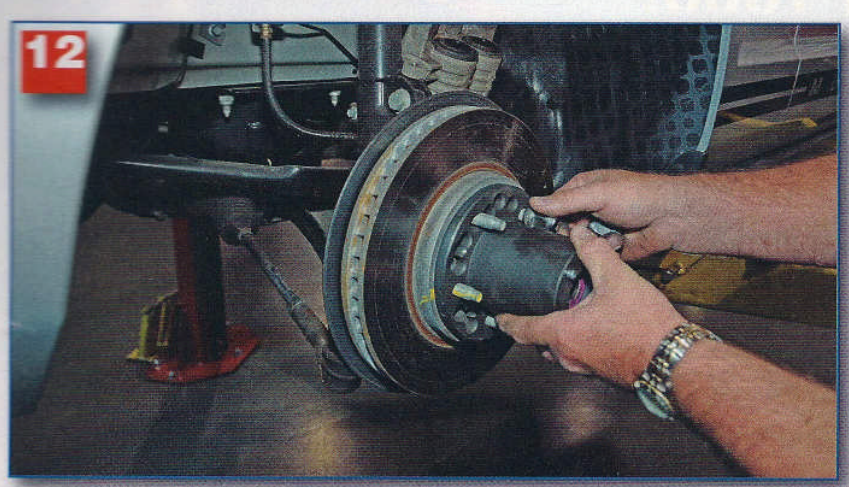


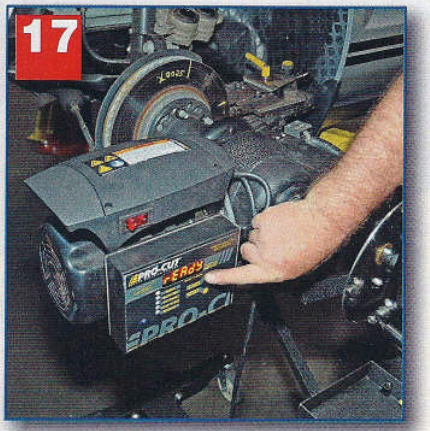
One of the keys to using this on-car brake lathe is the hub adapter. This adapter properly preloads the rotor hat and provides the correct clamping force to get the rotor to rotate as it would with the wheel installed.

Certain OE lug nuts, like those on this Mustang, do not allow the adapter to be installed because of their larger diameter. This lathe includes a set of lug nuts with a smaller outside diameter that enable the adapter to be easily installed.

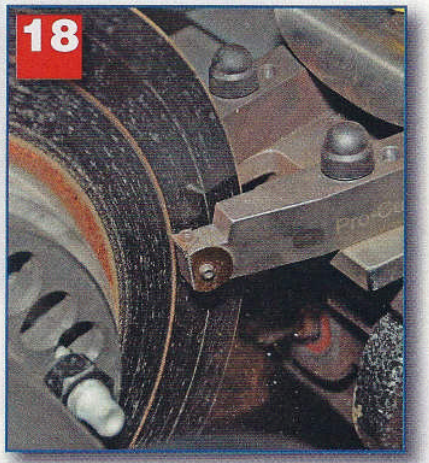
If you want to know the amount of rotor runout, put the adapter on, tighten the lug nuts and attach a dial indicator.

Mark the rotor, turn it a full revolution, note the amount of runout and write it on the rotor so you can remember it later on and note it on the work order. In this instance, there is 0.0025 inch, an amount usually just beyond specification but not yet causing pedal pulsation. However, if the situation continues, especially on one of these Mustangs that "go fast and stop hard," pedal pulsation may occur soon.

After putting on the adapter, slide the lathe into position and tighten the attaching knob.



Press the button for automatic runout compensation. This takes only a few seconds, and when it's finished the "ready" sign will come on.



You can now run the bits in and make contact or perform a scratch cut. Back off the bits, run the bits the rest of the way in, set your depth of cut, engage the machine and do the cut.

Before you actually take the cut, put a silencer on the rotor. Although not always necessary, using a silencer will prevent an irritating, high-pitched sound and possible chatter that can result in an irregular surface. It's just a smart service procedure.

The lathe is about halfway out with the cut performed. This particular lathe can provide a proper finish with one cut, saving cost and time.

After the rotor is machined apply a non-directional finish on each side with either a rotating swirl tool or a piece of sandpaper on a block. The choice is yours.

Wash the rotor with soap and water. You can either remove the rotor from the car or use a spray bottle of soap and water as shown.

If you use the spray-bottle method wipe down the rotor after washing it and repeat. There should be no residue on the rag. ■