

THE ARGUMENT AGAINST CROSS-DRILLED VENTED ROTORS

(by [Marcus Blair Fitzhugh](#), © 2007, reformatted for clarity)

They're for looks. OK, maybe removing material is good for reducing un-sprung weight, but that's about it.

It doesn't do anything for heat dissipation. The front discs on my car are vented. They're vented on every car that I know of. When a vented disc is spinning, it pulls air from the center of the disc, through the channels (which are called vanes), and out the rim of the rotor. The vanes in a Mercedes-Benz rotor are also curved. That's because the engineers who design rotors know that curved vanes move cooling air more efficiently than straight vanes, which are less expensive to manufacture. This cooling air moves in a radial direction. We can view the spinning rotor as an efficiently designed air pump.

The cross drilled holes in the disc must aid in this cooling design, right?

Not quite. Let's think about what happens. Air flow follows the path of least resistance. Does the air that's flowing from the center of the rotor to the path of least resistance go to the wide open vanes, or make a 90° turn, to holes that are drilled axially in the rotor?

So, since the holes aren't there to pull air in, and they don't aid in pushing the air out, you may be wondering why they were invented.

Cross drilled rotors were originally designed to cure a problem called *out-gassing*. Out-gassing was a problem where pads would overheat, and the binding material (glue) would melt down and vaporize. This vapor became trapped between the pad and the rotor, making the pad to float on a layer of vapor. The purpose of cross-drilled rotors was to allow the gas to escape.

The key word there is "was". Better high performance pad design has eliminated this problem.

If you simply can't bring yourself to believe that cross-drilled rotors are all hype, consider this. Why aren't cross-drilled rotors used in *NASCAR*, *Formula 1*, *Automobile Club de l'Ouest (ACO)*, or *ALMS*? If drilling holes in rotors was the hot ticket, at least one team in one of those associations would use them.

Some people will claim, "*Motorcycles use them!*" This is true, however, if you look carefully at a motorcycle disc you will notice they aren't vented, motorcycles use solid discs. They can use solid discs because they carry one eighth the weight of a car. If you drive a 400 pound car, solid, cross-drilled discs may be an option.

Still have doubts?

Here are some quotes from brake engineers, brake manufacturers, and automotive publications in regard to cross-drilled, slotted, and plain rotors.

AP Racing:

*"Grooves improve 'cleaning' of the pad surfaces and result in a more consistent brake performance. **Grooved discs have a longer life than cross-drilled discs.**"*

Baer:

"What are the benefits to Cross-drilling, Slotting, and Zinc-Washing my rotors?"

*"In years past, cross-drilling and/or Slotting the rotor for racing purposes was beneficial by providing a way to expel the gasses created when the bonding agents employed to manufacture the pads. However, with today's race pad technology, out-gassing is no longer much of a concern. **Slotted surfaces are what Baer recommends for track only use.** Slotted only rotors are offered as an option for any of Baer's offerings."*

Darrick Dong; Director of Motorsports at Performance Friction:

"Anyone that tells you that drilling makes the disc run cooler is smoking crack."

Waren Gilliland:

(Mr. Gilliland is a well-known brake engineer in the racing industry and has more than 32 years experience in custom designing brake systems ...he became the main source for improving the brake systems on a variety of different race vehicles from midgets to NASCAR Winston Cup cars.)

*"If you cross drill one of these vented rotors, you are creating a stress riser that will encourage the rotor to crack right through the hole. Many of the rotors available in the aftermarket are nothing more than inexpensive offshore manufactured stock replacement rotors, cross drilled to appeal to the performance market. **They are not performance rotors and will have a corresponding high failure rate**"*

Grassroots Motorsports:

"Cross-drilling your rotors might look neat, but what is it really doing for you? Well, unless your car is using brake pads from the '40s and 50s, not a whole lot. Rotors were first drilled because early brake pad materials gave off gasses when heated to racing temperatures, a process known as gassing out. It was an effective solution, but today's friction materials do not exhibit the some gassing out phenomenon as the early pads.

***"Contrary to popular belief, they don't lower temperatures,** (in fact, by removing weight from the rotor, they can actually cause temperatures to increase a little.)*

"These holes create stress risers that allow the rotor to crack sooner, and make a mess of brake pads--sort of like a cheese grater rubbing against them at every stop. Want more evidence? Look at NASCAR or F1. You would think that if drilling holes in the rotor was the hot ticket, these teams would be doing it. "

"Slotting rotors, on the other hand, might be a consideration if your sanctioning body allows for it. Cutting thin slots across the face of the rotor can actually help to clean the face of the brake pads over time, helping to reduce the glazing often found during high-speed use which can lower the coefficient of friction.

"While there may still be a small concern over creating stress risers in the face of the rotor, if the slots are shallow and cut properly, the trade-off appears to be worth the risk, (have you looked at a NASCAR rotor lately?)"

Power Slot:

*"At one time the conventional wisdom in racing circles was to cross-drill brake rotors to aid cooling and eliminate the gas emitted by brake pads. However, today's elite teams in open wheel, Indy and Trans Am racing are moving away from **crack prone, cross-drilled brake rotors** in favor of rotors modified with a fatigue resistant slotting process."*

Stop Tech:

"StopTech provides rotors slotted, drilled or plain. For most performance applications slotted is the preferred choice. Slotting helps wipe away debris from between the pad and rotor as well as increasing the "bite" characteristics of the pad.

*"A drilled rotor provides the same type of benefit, but **is more susceptible to cracking under severe usage**. Many customers prefer the look of a drilled rotor and for street and occasional light duty track use they will work fine.*

"For more severe applications, we recommend slotted rotors."

(Note that even though Stop Tech sells both drilled and slotted rotors they do not recommend drilled rotors for severe applications.)

Wilwood:

Q: "Why are some rotors drilled or slotted?"

A: "Rotors are drilled to reduce rotating weight, an issue near and dear to racers searching for ways to minimize un-sprung weight. **Drilling diminishes a rotor's durability and cooling capacity**"