10/10ths MOTORSPORTS

The Black Crack Report

The addiction you don't want to fight

Issue 31, September 2011

Upcoming 10/10ths Events

Only 2 events left this year

- **October 22nd & 23rd @ Putnam Park**
  - **3 Group HPDE with 2.5 hours track time per Day**
- **November 5th & 6th @ Carolina Motors Sports Park**
  - **Our first time at this great track.**

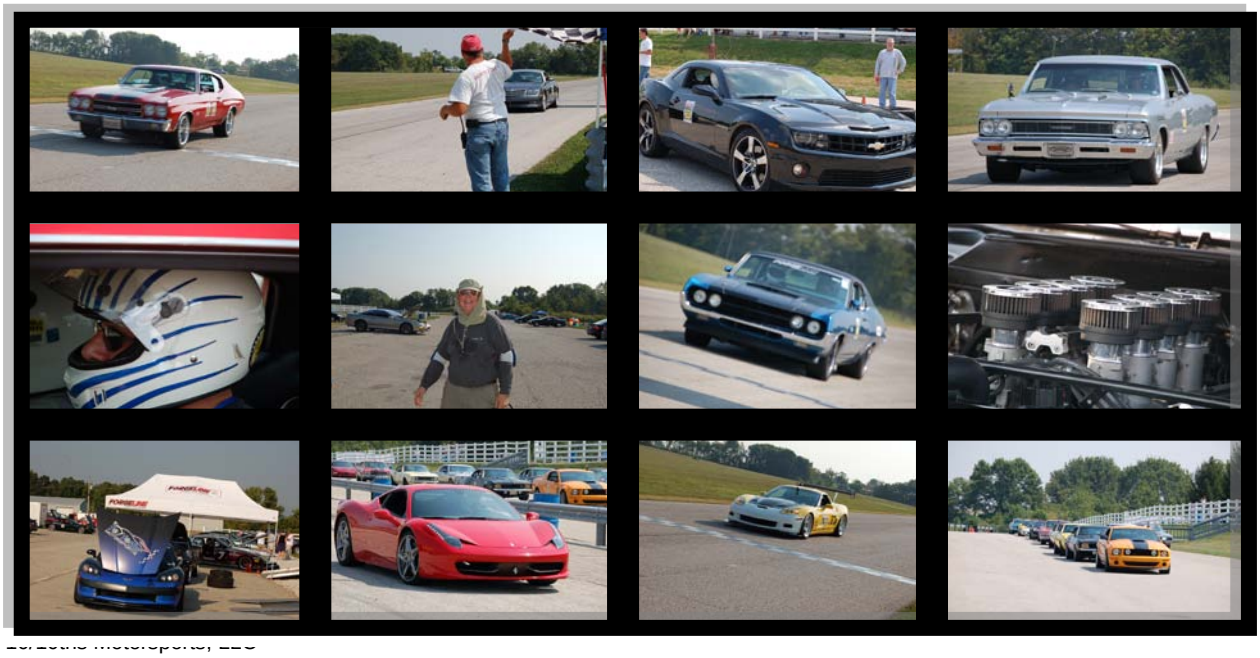
Registration is open for both events on the 10/10ths website:
www.1010thsmotorsports.com

2012 Plans ?

Discussions are being held about the formation of a 10/10ths Time Trial / Race Group for next year. Each track day would have one session dedicated to a competition race or TT involving only our most experienced drivers and well prepared cars. We have a number of drivers ready and asking for such a program within 10/10ths. This would be a serious step forward and not without many logistical, equipment, staff, rulemaking and legal concerns that need to be addressed. I personally think it would be a great success based on the quality of drivers we have at 10/10ths. I will be working all winter on this and will keep you updated. The insurance issues have already been worked out. The rules would be simple but there will be some additional safety requirements for any Races that we hold. Time Trial sessions would require less safety equipment than racing.
Get your transponders ready !!!!!

It will in no way infringe on the normal HPDE groups or drivers. After all, that type of infringement was one reason I started 10/10ths anyway. ☺

Some Great Photos from our recent events !



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10/10ths Tech Corner

Race Tire Technology

There is nothing better than a new set of race tires !! For those of you who are using them, you know exactly what I am talking about. At a course like Putnam Park, they can mean an additional 2 seconds off your normal lap times –vs- older tires. The problem is, they don't last that long and are very expensive.

For Novice Drivers and those who are thinking about making the switch to race tires, from street tires, I would suggest this:

- Stay on street tires for at least your first year.
    - I know, you want to go faster, but you must learn how to drive the car first as well as learn how to "feel" what the car is doing and how much grip you have. My first instructor gave me that advice right off the bat and it turned out to be very true.
        - Street tires force you to go a bit slower, thus you can worry about learning driving technique and less about speed. (Not to say you can't go 150 on street tires)
        - Stree tires give you plenty of warning (squealling), before they loose their grip and cause a spin.
        - They are cheaper and last much, much longer.
    - Race tires give you almost NO warning before they lose grip. If you have not learned to "feel" the car, you could be in for a quick spin.
    - Race tires are not cheap and do not last long.
    - Race tires are better than (you fill in the blank) though. You just can't beat em and the first time you drive with them you will be simply amazed that the car just goes faster all by itself. (or so it seems)

As for race tire technology, it is a complicated issue that you need to understand.

Heat Cycles

Rubber is a complex substance, a mixture of materials and chemicals manufactured with mechanical processes and various heat and pressure cycles. In use, tread rubber sees mechanical working and time at elevated temperatures very similar to the processes it saw as it was manufactured. It makes sense that more of the same processing would further change the rubber.

The material in a new race tire is semi-stable. If the tread rubber had been totally cured it might be too hard to do its job. So stress and heat can continue the curing process. Even small amounts of energy from ultraviolet wavelengths in sunlight, ozone in air, heat, or mechanical working can cause the rubber in a tire to continue its vulcanization process or change in some way. The first heat cycle is called just that, "heat cycling". Every heat cycle changes a tire to some degree, generally in the direction of harder, less flexible, and less adhesive. Race tires can loose effectiveness before the tread wears through if they go through many heat cycles. For some tires three cycles is too many, while others show a performance drop off initially and then maintain a good level of performance until the tread is worn off.

> Leading tire manufacturers including BFGoodrich, Kumho, Nitto and Yokohama offer competition type tires that qualify as DOT legal for street use. Autocrossing, race days, driving schools and other racing venues demand this category of tire for maximum performance. However, like any high performance part, these tires require careful break-in to achieve the full benefit of their construction.
>
> A competition tire is built with a highly sophisticated tread compound. This compound is capable of sustaining traction throughout a much wider temperature range, but is also extremely sensitive to the first heat cycle of its use. During this cycle, if controlled precisely, the tread compound stretches as it heats, breaking the weaker, shorter molecular bonds within the rubber. *The benefit of this process is a tread compound that lasts longer and provides better traction.* However, if the first cycle is not performed correctly, the tread may develop irregular compounding, leading to poor wear and inconsistent traction.
>
> In the past, many racers tried to "heat cycle" their own tires with mixed results. In addition to the inconsistency, there was the inconvenience of mounting and dismounting the tires before using them to race (after the first heat cycle, a competition tire must be rested 24 to 48 hours to reform the molecular bonds).

Abrasion and Graining

The abrasion patterns shown in the photos in Fig. 8.6 were produced by abrading two different rubber samples on different road surfaces. The abrasion profiles compare natural rubber abraded on silicon carbide cloth (the top row of photos) with a worn tire (the bottom row).

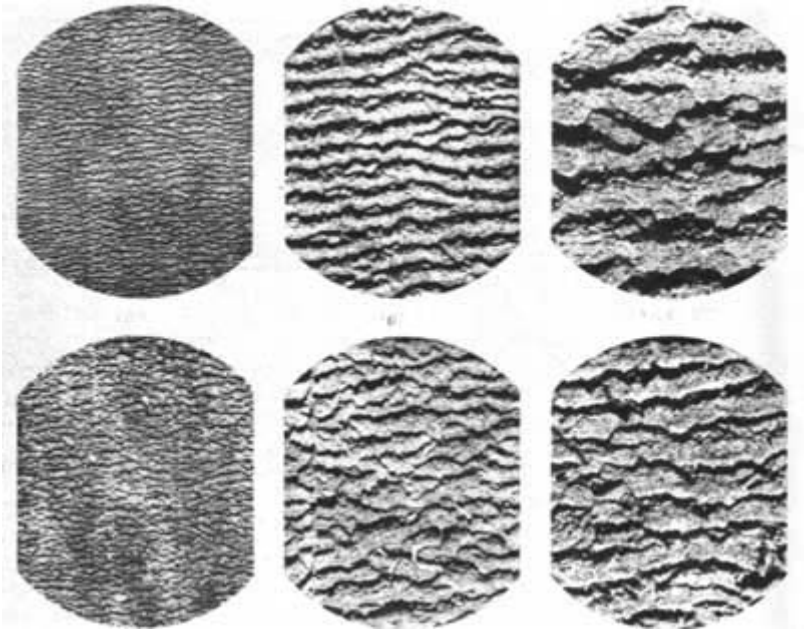

Fig. 8.6

What you see here is called graining. The cause, typically, is overly aggressive driving with a tire that is too soft and grippy for the conditions **or the driver has overworked the tires before getting them up to a working temperature**. Abrasion patterns are not necessarily caused by gross sliding. A requirement for the development of an abrasion pattern is "unidirectional sliding." Sliding in random directions does not produce these patterns. The orientation of the pattern is important because it indicates the direction of relative motion between the tread and the road.

Here's how that pattern gets worked into the rubber. When a new rubber sample is continuously abraded in the same direction, the rubber develops an array of nearly parallel ridges at right angles to the abrasion direction. The shape of the ridges in cross section, seen in Fig. 8.7, is saw toothed, with the teeth pointed against the direction of abrasion. During sliding, deflection waves in the rubber turn into peaks which are bent over, exposing the upstream side to abrasion. The peaks wear thinner into teeth and the tips are eventually torn off.

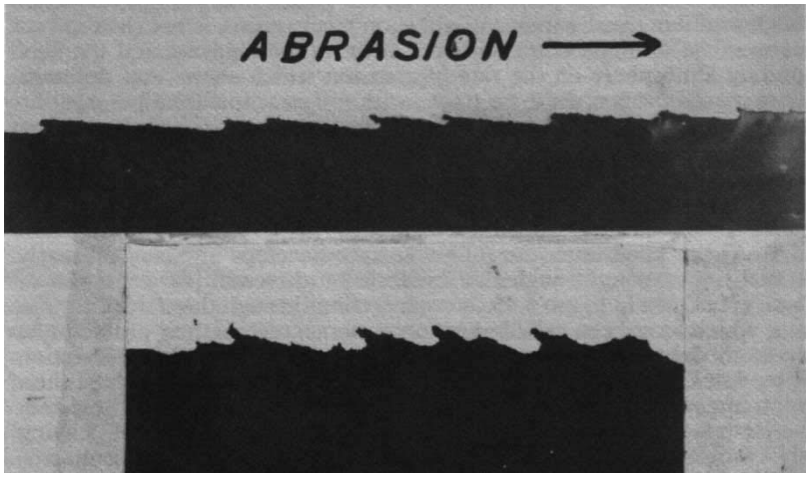

Fig. 8.7

Sliding on smooth tracks does not always produce abrasion. Abrasion is generally initiated by local stress concentrations at the contact between track asperities and rubber. Abrasion intensity depends on shape rather than size of the asperities. Experiments have shown that road surfaces exhibit wide variations in abrasion characteristics.

Lab experiments with abrasion in an inert atmosphere-nitrogen-show less abrasion than the same process in air. This leads to speculations that antioxidants in a rubber compound can make it more resistant to abrasion.

Unfortunately, once a graining pattern is worn into the surface of a tire it's difficult to wear the pattern away. The ridges tend to perpetuate as wear continues. Even worse, since the tread is not evenly loaded after it has been grained, the tire loses grip. It's just another way for a driver to mess up. That's why experienced drivers are so valuable.

Graining on Pavement

Fig. 8.15

These photos show graining on tires used in club racing on a pavement road course. The tire in Fig. 8.15 shows a front tire with even wear, no graining.

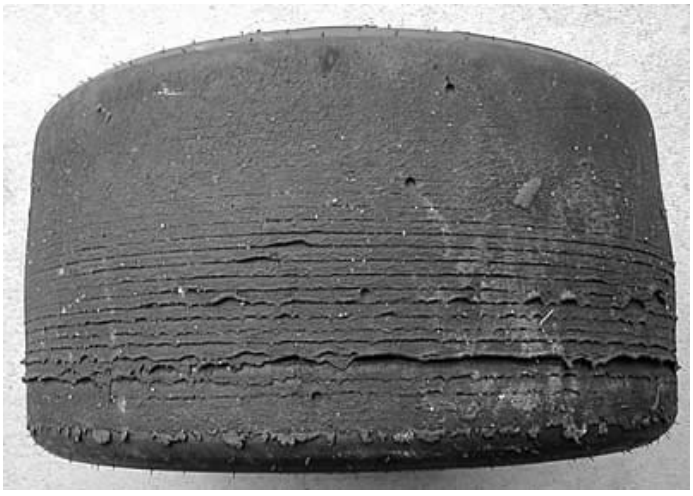

Fig. 8.16

The image above, Fig. 8.16 presents a front tire with extreme graining. This tire is toast!

The last photo, Fig. 8.17, is a rear tire with graining on the inside edge, perhaps due to excessive camber. The graining is not present across the entire tread, suggesting slippage during acceleration. More camber would create more graining and the pattern would appear over a wider area of the tread.

Fig. 8.17

Blistering

If the vulcanization process goes too far, the rubber can "revert" or return to its uncured state. Reversion can also happen when race tires get way too hot. When you see a driver lock up a tire the smoke tells you something bad is happening. The resulting flat spot is caused by frictional heating of the tread rubber causing reversion. The overheated rubber softens and is scrubbed off the tire.

Another, less severe, form of reversion is blistering. The photo in Fig. 8.18 shows a right-rear tire with a line of blisters around its circumference. Too high cold inflation pressure or too much pressure build-up during use caused the tread to overheat. The heat is generated at the interface between the belt plies and the tread and the rubber melts, causing a local blister.

Fig 8.18

Mark Blundell won the Fontana CART race in 1997 for the PacWest team but he barely dodged the blister bullet. It was a very fast race on a very hot day. The Firestone guys saw the problem after early pit stops and told the teams to use lower cold pressures that would decrease loading in the middle of the contact patch. But a few teams still had problems.

Some tire companies have developed anti-reversion compounds that resist blistering. If you can run your tire a little bit hotter without blistering that would be more forgiving for the racers using the tire and maybe the tire would give a little more grip at the higher temperature. That's assuming the anti-reversion compound has no negative trade-offs.

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Did You Know

10/10ths Motorsports, LLC is a Hawk Brake Distributor. I can get you some great brakes at a great price. With your 10/10ths driver discount, I can almost always provide you with the best pricing. They can be shipped to your house or brought to the track at our events. Email me or call if you have questions or need to order. Thanks !!!!!! Your support will no doubt help 10/10ths Motorsports in providing track days for all our drivers.

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