

# LAP #1, RACE TIRES

Your tires are the only means your car has to communicate with the road, so selecting the correct ones are a key to going fast. Many road races were won by lesser-powered cars that could out handle the competition. In a race environment, it's not about fast lap times and running the perfect line. It's about handling—making your car go places and do things the other guy can't. It's really pretty simple: when you make a steering input, the car must respond; if it doesn't, you slow down.

A term referring to the angular difference between where a tire is pointing and the direction it is actually traveling is called "slip angle." Simply put, you have slip angle if your tires are not pointing in the direction they are traveling. This is sometimes referred to as "push" because the car is pushing the tires in a direction other than where they are pointed. Understanding slip angle is important because it relates to two available designs of racing tires: radial ply and bias ply. Because the two tire designs are constructed differently, they behave differently; both produce the same amount of ultimate grip but at entirely different slip angles. For correctness sake, vintage racing requires the use of bias ply tires, but don't feel sorry for the vintage racer. They would use bias ply, even if not mandated, because they're easier to drive.

To go fast, understand the goal is to continuously run your tires at the limit of grip. By design, radial ply tires have a more compliant sidewall than bias ply and maintain contact patch longer for a given side load, thus producing grip at a higher rate than bias ply tires. At first glance, this seems to give the radial a distinct advantage, but let's look a little deeper.

When compared to bias ply tires, radial ply tires produce grip at relatively low slip angles all the way up to the grip limit, where they exhibit the unique characteristic of going "over the top" (see figure 1), and begin producing less grip as slip angle continues to increase. By the time you reach this point you're probably well off the track, traveling backwards at a high rate of speed and wondering how bad it's going to hurt! When compared to a bias ply tire and driven at the grip limit, the radial design

is not as forgiving; in fact it's much more difficult to drive. Driving consistently at the grip limit is where real speed is found.

Now using the diagram, let's examine the curve for the bias ply tire. See how it never inverts and extends much further to the right? This means you'll be sliding a long time before reaching the grip limit. This tire will be warning you well in advance, allowing you to "save it" when you reach the grip limit, because ultimate grip doesn't fall off with further increasing slip angle. Bias ply tires speak to you through the steering wheel, give lots of warning and when driven near the grip limit, are no slower than radials because they produce the same amount of ultimate grip.

Nirvana to a road racer is sliding through a corner in a four-wheel drift, arms locked, using only the throttle to steer. If you've ever watched race footage from the 1960s, you've noticed the cars are constantly sliding because of bias ply tires. Today, we turn better lap times than they did in the day because

our tires are better. But we get to slide while doing it and have much more fun than the guys running radials! Racers driving late model Mustangs usually run radials and are taught not to slide the car because it wastes energy and slows the car. In a vintage Mustang running bias ply tires, if you're not sliding, you're getting passed. Most passengers taken for demonstration laps in a vintage race Mustang are amazed just how much the cars slide or are "out of control." I've heard many drivers in faster late model cars enjoy following the vintage cars on test and tune days and refuse to pass because they just love watching the old cars slide around.

When shopping for track tires for your Mustang, consider giving bias ply race tires a chance. I promise you'll be as fast as the next guy and have a whole lot more fun when looking out the side window instead of the windshield

Until the next lap,

Roadracer

## Slip Angle vs. Grip

