My favorite topics for columns tend to be psychological in nature, dealing with the mind, spirit, emotions, beliefs, motivation and various other intangibles. These topics fascinate me and an understanding of them allows me to better communicate with our customers at the racing school.

But in this installment, I'll cover a topic that is much more mechanical.

Frank Hawley's NHRA Drag Racing School has been teaching people to drive alcohol cars for about 20 years. Our graduate list contains noted Pro drivers Tony Schumacher, Larry Dixon, Brandon Bernstein, Doug Kalitta, Whit Bazemore, Tony Pedregon, Eric Medlen, Tim Wilkerson, and many others. No one in the country has seen as many new drivers as we have. Having taught hundreds of new alcohol drivers, worked with experienced drivers and driven alcohol cars myself, I've become a pretty good observer and evaluator of drivers.

Here I'd like to look at what makes these particular vehicles some of drag racing's most challenging vehicles to master, from a driver's perspective, but I must first address a couple of popular untruths. First, because alcohol cars are difficult to drive, does not mean it is harder to win in an alcohol car than it is in any other type of drag race car. Anyone that thinks it may be easier to win in Super Comp or Pro Stock than in Alcohol is uninformed; it's always hard to win. Second, alcohol cars are not necessarily the hardest to drive. A nitro car creates such incredible downforce that a dropped cylinder can cause the car to veer instantly to the wall or center line and actually understeer or push so that the driver's input on the steering wheel has little or no effect on the trajectory of the car. Likewise, a nitro car has so much power that, on occasion, the car will simply start smoking the tires at 1000 feet! Imagine accelerating past 290 mph, on your way to 320 mph and then hitting a patch of ice. A nitro car can experience such conditions that under most circumstances, an alcohol car simply won't. However, there are some things that make alcohol cars more difficult to drive than all others. Simply stated, an alcohol car's performance can be more affected by driver input than any other type of drag race car. To illustrate I'll focus on one specific task: starting-line leave rpm.

Starting-line leave rpm is an important number. The correct rpm at which a driver leaves is determined by the crew chief; in an alcohol car, this number will probably range from 5000 rpm (lower than most) to 6500 (higher than most) and will be selected based on the gear ratio, tires, chassis, track, weather and an assortment of other variables. Assuming the perfect leave rpm (if there can be a perfect rpm) for a given car and set of conditions is 6000 rpm, a change in this rpm may adversely affect the car's performance.

To understand why starting-line rpm matters, you'll need to understand the role that the clutch plays in the car's performance. The clutch in an alcohol car slips as the car leaves the starting line and gradually locks up over the first second or two of the run. The curve that develops as the clutch "locks up" is in effect an infinite gear-ratio change from the start to lock up. This allows the engine to “rev up” into an area that makes good power while at the same time applying enough torque to the rear wheels to maintain an ever so slight wheel spin promoting maximum acceleration without smoking the tires. It is in effect a fine balancing between car and racing surface. When you get it just right, it’s a beautiful thing.

Generally speaking (there are always exceptions), if the driver leaves at a lower rpm than is asked for, the clutch locks up sooner. This may sound backward, but remember, as you add power, any given clutch adjustment will loosen up (assuming you don’t smoke the tires), and as you take power away, by leaving too low, any given clutch adjustment will tighten up; therefore, lower rpm adds clutch and will change the clutch curve, causing different conditions 60’ or more down track if rpm is not right at the starting line. Likewise, if the driver leaves higher than suggested, it can actually take clutch out of the car, causing it to slip more than expected, which also affects performance adversely. However, as a result of increase plate load applied to the clutch due to counterweight onto the clutch arms, a further increase in engine rpm can reverse the process and add more clutch force than would have been applied if the driver had left at too low of rpm!

This principle applies to all drag cars, but here is what makes alcohol so different: They are the only cars in drag racing where the driver controls the starting-line rpm! Every other type of car either leaves at an idle or on an rpm limiter chip. In an alcohol car, it's all up to the driver, and I'll tell you that getting the engine rpm exactly at a predetermined number and holding it absolutely steady with your right foot throughout the staging process is difficult. Let me add another often overlooked variable: The driver needs to release the clutch pedal and apply the throttle pedal in unison: If the driver is a few hundredths early with the clutch pedal, the rpm is pulled down before the throttle is applied, and if the driver is a few hundredths early with the throttle, the engine rpm jumps instantly, causing a leave rpm higher than expected.

The stuff that I’m talking about here is subtle. The differences between good and great drivers are small, and without years of experience, it’s difficult to detect. Next time I’ll discuss shift points and their effects on performance.