Cut Your Losses: How to Reduce Parasitic Drag

Whether you race Stock or Pro Stock (or any other class for that manner), many proven theories exist in regards to performance. More power and lighter weight are two components of any go-fast recipe, and it is safe to say that even a novice can understand why a lighter car is quicker than a heavier one and why adding horsepower equals quicker e.t.s. In most NHRA classes, rules dictate the level of modifications you can make and the minimum weight at which you must run.

Naturally, you do many obvious things to increase power, such as build a bigger engine or pop in a bigger cam, but what if you've exhausted all of your options in terms of legal modifications? What do you do then?

The answer is to look deep into the combination to free up horsepower in places you may never have thought of, and you can do so by reducing parasitic losses within the car. Parasitic drag is created by friction and loads on items within the car, most of which are unavoidable. But with today's materials and technology, the amount of friction and loading can be greatly reduced or better-managed, resulting in better performance.

Anywhere there is friction, there is a potential loss of power and performance, so by improving the efficiency of the vehicle's systems, you can essentially free up horsepower, or at least reduce performance-robbing friction.

Beginning at the ground level, the first substantial friction we find is between the tires and the track. The weight of the vehicle pushes down on the tires, so we can gather that a heavier vehicle, or one with greater downforce (when there is downforce), will cause a great amount of friction between the track and the tires. Racers figured out long ago that placing less rubber on the track (in the front or on the non-drive tires) combined with more air pressure reduces rolling resistance. Using skinnies in place of a typical front tire on a vehicle today can be worth a tenth in performance and a full mph or more. Drag racing requires a soft compound on the drive tires, but unfortunately, softer compounds mean more friction.

To improve performance, tire manufacturers have developed radial slicks and DOT-legal drag radial tires that feature radial construction (rather than bias-ply). This results in stiffer tires that can generally be run with more air pressure. Making the tires harder (due to higher pressure along with stiffer radial and sidewall construction) reduces friction and improves performance, but the tires are designed with a soft-compound tread so there is no loss in traction, especially when the car is set up well. Radial slicks have been known to be worth between .08- and .10-second on most cars, and drag radials aren't far behind. In fact, drag radials are really popular, so much so that there are specific race classes designed just for cars using those tires.

Street-going vehicles are often equipped with a host of belt-driven engine accessories, and, you guessed it, it takes power to turn those accessories, so eliminating them, or using electrically driven ones, can free up power. For testing purposes, I once removed the entire serpentine drive belt from a late-model Mustang and saw an instant drop in elapsed time of .25-second and a gain of 2 mph. This equated to about 25 horsepower. Of course, you couldn't run very long without a water pump or alternator without overheating or killing the battery, but for a single run, it showed the effect of eliminating the drag on the front of the engine.

For race and some street applications, the hot ticket is to replace the belt-driven accessories, such as the cooling fan and water pump, with an electric version and to eliminate the power steering when applicable. Most modern vehicles already come with an electric fan, but the newest technology, like that found on the current 5.0 Mustang, is the electric power steering assist.

Inside the engine you can also find loads of parasitic drag. The greatest offenders are the piston rings. Because we need the rings to seal in the combustion, it would be pretty tough to eliminate the rings and the friction they create, but all is not lost, because many quality synthetic oils do wonders for reducing friction. This also goes for fluids found in the transmission and rear end. Better materials, finishing, and coatings have also allowed for lower-viscosity oils without sacrificing durability or power.

For those with deeper pockets and a taste for higher technology, there are other ways to reduce friction and parasitic drag. Some of these include trick bearings (engine

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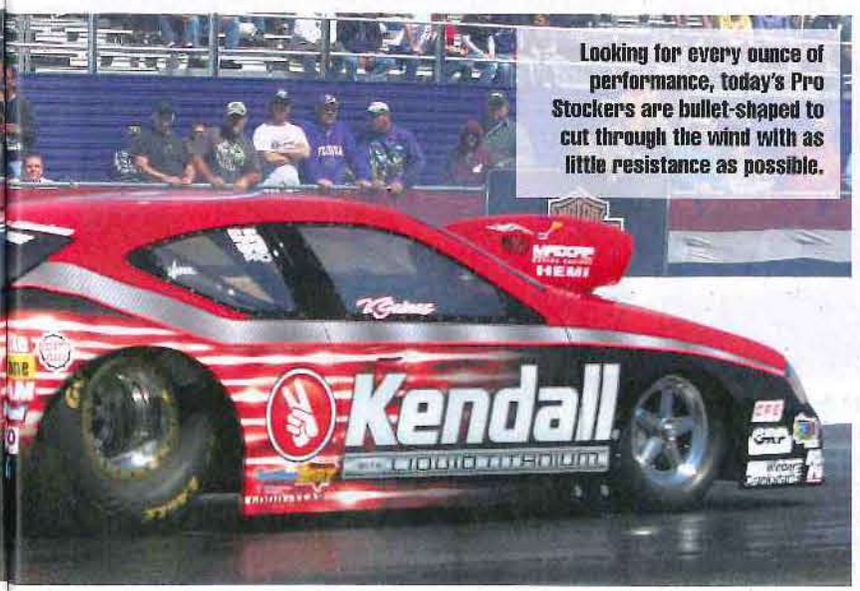
Today's cars are really efficient. With just a bolt-on blower, headers, and a re-flash of the factory tune, our Amsoil/*Muscle Mustangs & Fast Fords* project GT ran as quick as 10.65 at nearly 130 mph with an automatic transmission and air conditioning.

A lot of performance can be had by dialing in your engine, and I'm not talking about the carburetor or EFI. Running the right oil pan and the right oil (and amount of oil) can be worth substantial power gains. It's not uncommon for Stock racers to drain a quart (or two) when they need a tenth.



Looking for every ounce of performance, today's Pro Stockers are bullet-shaped to cut through the wind with as little resistance as possible.

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While a huge part of the power-making process, superchargers cause a huge load on the engine, which results in parasitic losses. In fact, it takes a brute-like starter just to get one of these beasts cranking enough to fire.

and wheel) and expensive oils. For racers using a wet-sump oiling system, a deep-sump oil pan is a surefire way to reduce internal drag by getting the oil supply away from the spinning crankshaft. If you are not afforded that option, either due to budget or rules, you can remove a quart (or two) of oil from the engine (and also some from the transmission and rear) and improve performance.

Imagine if you swung your arm around like a hand on a clock and at the bottom of the circle your hand and arm smashed into a large bathtub full of oil. Your arm would decelerate rapidly. Well, when the crank spins, its throws and counterweights meet a similar fate as they sweep down into the oil. This not only slows the crank but also causes vibration and aerates the oil, which can lead to foaming. So in some engines, reducing the oil capacity can not only improve power by reducing drag on the crank, but it can also be good for the engine because it reduces vibration and prevents the oil from becoming aerated.

You may ask why the factory doesn't just use less oil? And that is because most street engines aren't run for just a few seconds at high rpm. They must operate for longer periods between oil changes, plus the oil is used for cooling purposes, which isn't a concern in a drag race engine, but it's very important in a street engine that sees much higher temperatures.

Of course, there are many, many more places where parasitic drag can be improved, but there just isn't enough room to cover them all. With that, I encourage you to take a long, hard look at your car to see where you can find power-robbing drag and do what you can to reduce it. **ND**

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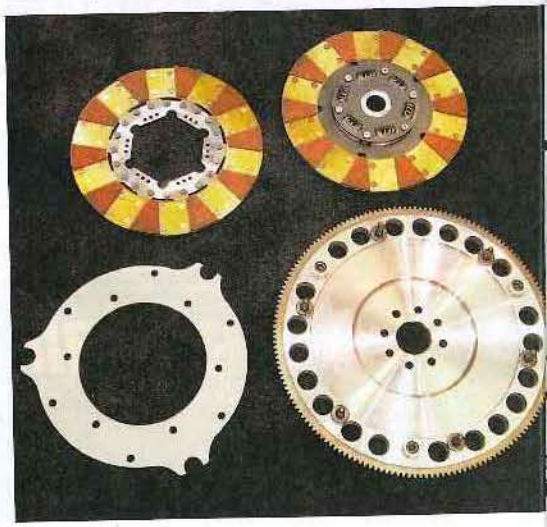
Reducing weight in the driveline cuts parasitic drag and helps the vehicle accelerate faster. Pictured are some parts from Strange, including gun-drilled axles, lightweight calipers and rotors, and a back-cut ring gear.

You can find gains in performance by testing on an engine or chassis dyno. I've seen gains of 5 to 10 horsepower at the wheels just by changing tire compounds.

Most stick racers rely on bias-ply tires, which are run at relatively low pressure. This allows them to absorb the shock from the initial hit during launch but creates lots of drag downtrack.

(Above) Lighter is better, so drag racers use skinny front tires that save weight, have a small contact patch, and provide the potential for less drag when aired up.

In contrast, many automatic racers use radial slicks, whic are much stiffer and thus have less drag. This is one reaso they are quicker in back-to-back testing than bias-ply tires



(Right) Light driveline parts, like this aluminum flywheel pictured with a dual-disc clutch, further reduce drag. It's not uncommon to see lightweight aluminum parts inside the best automatic transmissions.