

MORE THAN SLIPPERY

The right engine oil does far more than merely lubricate.

By Dan Anderson



Oil is the only thing that stands between your crankshaft and destruction. (Photo by Jason Beck, Illustration by PMG)

The correct type and viscosity of engine oil can help a high-performance engine break in faster, live longer, run cooler, gain horsepower, and save money. Here are some general concepts about engine oils used in racing engines:

ZDDP. Racers don't need to be able to pronounce *zinc dialkyldithiophosphate*, but they need to have it in their racing oil. Under heat and pressure, zinc, phospho-

rus, and other compounds in ZDDP create a microscopic layer of hard, glass-smooth material that coats and protects wear surfaces on flat tappets, cam lobes, and other components that operate under extreme heat and pressure. Unfortunately, vapors released from ZDDP in engine oil can corrode catalytic converters on passenger cars, so since the late '70s passenger car engine oils have had reduced ZDDP levels.

Thinner creates more power and allows tighter clearances. Synthetic oil often has less friction than conventional oil and dissipates heat better. Some conventional oils have added ZDDP. Driven offers both options. (Photo by Jason Beck)



“Modern passenger car engine oil shouldn’t have more than 800 ppm (parts per million) of ZDDP,” says Larry Ludwig, chief chemist and technical director for Schaeffer’s Specialized Lubricants. “Racing engines, especially flat tappet engines, need at least 1,200 ppm. Even though roller cam engines don’t have high pressures on the valve train like flat tappet

engines, the extra ZDDP helps with rings, crank, cam chains and sprockets. ZDDP is a good thing for a racing engine.”

That doesn’t mean “if a little is good, more is better.” There is finite space for molecules of ZDDP on the surface of rod journals and other engine components. More additives than can be “absorbed” have no benefit, and may actually upset

the delicate chemistry of high-quality oil.

“If there’s too much ZDDP in the oil, or if someone adds an oil additive, there can be competition for the available surface area at the molecular level,” says Kyle Fickler, director of sales and marketing with Driven Racing Oil. “Plus, not all ZDDP is the same. If Motor Oil ‘A’ has one type of ZDDP and you add ZDDP with a different

Don’t Do-It-Yourself

Lucas Oil is famed for its high-quality “pour-in” additives for lubricants. But when it comes to racing, Tom Bogner, Lucas Oil’s director of R&D, doesn’t advocate additives.

“(Pour in) additives have their place, but they’re not designed to make a passenger car oil into a racing oil,” he says. “Racing oils like Lucas Oil’s ‘racing-only’ line of engine oils are a carefully balanced blend. Aftermarket additives can upset that balance and degrade performance. Plus, by the time you buy passenger car oil and then pay for additives to blend in, it ends up as expensive as a quality racing oil blended specifically for racing.”

formulation, you risk an additive clash that could reduce their effectiveness.”

Some engine builders and racers maintain adequate levels of ZDDP at an economical price by using Shell Rotella Diesel Engine oil, which contains 1,200 ppm of ZDDP. Chad Mullins, owner of Mullins Race Engines, acknowledges many engine builders and racers use Rotella, but favors race-specific engine oils.

“Back when they had to cut ZDDP because of catalytic converters, Rotella was a decent option for racing oil,” he says. “But since then the racing oil manufacturers have improved their oils. If you stick with a name brand ‘racing oil,’ you’re going to get a quality product designed for the hard life a racing engine leads.”

Break-in Oil. A trend toward low-pressure piston rings has escalated the importance of break-in oil.

“In the past five years ring pressures have dropped to the point where we’re running crazy-low pressures,” says Mullins. “Low tension rings are basically free power, but with such low tension, you’ve got to have good break-in oil. I use a 100% mineral-based break-in oil because it’s loaded with what I call ‘vitamins’ that help break in the rings, cam, lifters, and all the parts that need special attention on a new or rebuilt engine. We use 10W-30 break-in oil in an engine, run it on our dyno, then drain and do a filter inspection. Then I put

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Racers who run methanol fuel already know it and racers adapting to E85 gasoline will learn it: alcohol-based fuels dilute engine oil.

in another level of break-in oil, say a 15W-50, and give (the engine) to the customer and tell them to put on 50 to 100 laps and then drain that oil. After that, semi-synthetic is the best bang for the buck in dirt racing. Full-synthetic oil is my suggestion for pavement racing. (More on change intervals later.)

Backyard engine builders lacking a dyno can break in a new or refreshed engine on the track.

"Put the engine in a car, and the first time out, ride the brake to put a load on it," says Jack Bateman, owner of Jack's Competition Engines. "Run it up to 3,500 rpm under load, then back down to idle, up and down, up and down, for as long as you can stand to do it. After you've cycled it enough the first night to get the rings seated, drop the oil, change and check the filter, then give it fresh, quality racing oil. After that, drive it like you stole it."

Viscosity voodoo. Viscosity is a measure of how easily oil flows at a specified temperature. A 10-weight oil is thinner—flows more easily—than a 50-weight oil. Viscosity can influence power output.

"There's potential to gain a few horsepower by using a lighter viscosity engine oil in a crate engine," says John Davis, owner of Midstate Machine. "Clearances are tighter in a crate, and thinner oil works things less, especially the oil pump. You may actually gain five to 10 horsepower with lighter viscosity synthetic oil in a crate engine compared to a heavier oil. But you may want to run a higher viscosity oil in a built engine because those engines have looser clearances and benefit from the thicker oil film."

Cooling is an oft-overlooked function of racing oil that's influenced by viscosity.

"Thinner oil not only doesn't work the oil pump as hard (as thicker oil)," says Tom Bogner, director of research and development for Lucas Oil, "but thinner oil flows across the engine parts faster and does a better job transferring heat. People some-

First Filter Facts



"Don't break in an engine with a 'racing' engine oil filter," says Driven Oil's Kyle Fickler. "Use a quality filter like a Wix XP or equivalent oil filter. Racing filters were originally designed to work with the oil pumps that flow huge volumes of oil for dry sump engines. They have a relatively coarse micron rating to allow high flow rates. The dirtiest oil an engine will see is during break-in, so it's best to use a filter with a smaller micron rating to catch all those fine particles during break-in."

times forget that engine oil plays a big role in engine cooling."

Improved cooling is only one of the strengths of synthetic racing oil.

"Some synthetic oils have less friction (than conventional oil), which reduces heat by itself," says Ludwig, with Schaeffer's Specialized Lubricants, "but they also have the ability to dissipate heat better than natural oil. Full synthetic racing oil has multiple advantages."

Dilution, contamination, and change interval. Racers who run methanol fuel already know it and racers adapting to E85

gasoline will learn it: alcohol-based fuels dilute engine oil.

"E85 definitely increases oil dilution compared to race gas or pump gas," says Ludwig. "Be aware that if you're running a high percentage of alcohol, you may need to change oil more often."

As mentioned earlier in the story, dirt track drivers should change oil more frequently than their pavement brethren no matter what type of fuel they use. Frequent oil changes in dirt track engines favor more economical non-synthetic engine oils.

"If I'm a Saturday night dirt track racer,



Some racers use Shell Rotella, especially in crate engines, because it has high zinc content. However, it lacks the specific additive package designed for racing vehicles and is more suited for OEM applications.

there may be less of an advantage to full synthetic oil," says Bill Alexander, Driven Racing Oil's lubricant technology manager. "There are two reasons to change engine oil—contamination and oxidation. Racing on dirt by nature allows more contamination to be ingested into the crankcase oiling system. This contamination will most likely result in the need to change the oil because it's contaminated with dirt long before oxidation become an issue. Oxidation is more of a pavement racer concern, so the extended change interval of pavement racing may make full synthetic an economical choice."

A final word on oil changes comes from Steve Hendren, co-owner with his brother, Mike, of Hendren Racing Engines: "Guys spend tens of thousands of dollars on an engine, then whine about spending a hundred bucks to change the oil and filter. Talk to your engine builder, discuss where you race (dirt vs. pavement), how hot you run your engine, how hard you turn your engine, and then change the oil at the interval he recommends. There's no point in saving pennies if it's going to cost you dollars." ☞

SOURCES:

Driven Racing Oil
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828-286-0780

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