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Using The Right Oil to Improve Crate Engine Performance

7-8 minutes

How the right oil can improve crate engine performance

By Cindy Bullion

The crate engine. It invaded the dirt racing world promising affordability and fewer mid-week maintenance requirements, compared to a custom-built engine. But with those positives came somewhat of a leveling effect in terms of on-track performance, with driver error (or lack thereof) often more at play than mechanics in

finishing well. Squeezing out extra horsepower and torque to gain small advantages means smartly choosing components, such as a carburetor, distributor, alternator, and even lubrication.

Inertia dyno testing of a 602 crate engine showed an increase in performance and decrease in wear when using two lower viscosity synthetic oils from Driven Racing Oil than when using a factory-recommended conventional 15W-50 oil.

Selecting the improper engine oil for any application can not only lead to increased engine component wear and overheating, but also zap horsepower and torque output. Pick the right one though, and you could increase engine performance just enough to power around the leader and take the win.

In inertia dyno testing by Driven Racing Oil, a 602 crate engine picked up 5.3 hp and 6 lb-ft of torque when running Driven's synthetic XP3 10W-30 versus the factory-recommended oil. Driven's heavier synthetic XP9 10W-40 was also tested and resulted in gains of 3.3 hp and 3.8 lb-ft of torque.

Certified Lubrication Specialist Lake Speed Jr. notes the testing

method was designed to provide results as close to what you may find in a real racing situation. Instead of doing a long pull on the dyno, the operator pushed power close to the engine's rev limiter then backed off quickly and, in close succession, accelerated again.

"We did it just like if you were driving on the track, on and off the throttle," he says of the 25-lap simulation, adding that data from only the last five laps was used for comparison. "The horsepower and torque differences are more accurate due to the engine's operating temperature being similar to the real world at that point. Also, the data is more significant because it is an average of five runs instead of a single run."

The recorded increase in performance can be attributed to several factors, including lower viscosity and chemistry.

"You're not compromising anything by changing viscosity, because it's formulated as a race oil," Speed says of selecting XP3 or XP9 instead of a factory-recommended 15W-50 from your local retail store. "Off-the-shelf passenger car oil chemistry is not ideal for race applications, so that's why the factory recommends a higher viscosity, to compensate."

An exception to the recommendation for decreasing viscosity is in the case of a rebuilt crate engine. Speed says a conversation with your engine builder would be needed since looser clearances typically mandate a higher viscosity.

He elaborates that, contradictory to popular belief, a higher viscosity oil is not necessary to prevent lifter collapse at high rpm. While lifter collapse is possible when "banging off the rev limiter," a lower viscosity oil allows lifters to more quickly recover on the track.

A lower viscosity oil also promotes better cooling in crate engines, which due to their wet sump, tend to run hot. By more easily cycling through the engine, a lower viscosity oil can better regulate engine temperature with no need for a cooler. It's important to not overfill the engine, however.

"That kills horsepower and makes the engine run hotter," Speed says. "It's better to be ½ quart low than that amount high, especially if using a higher viscosity oil because that compounds the issue. When filling, allow time for the oil to drain down to the sump."

He recommends adding six quarts, then moving on to something else for 30 minutes. Continue to add ½ quart at a time, with a drain

interval in between, until the proper oil level is reached.

Regarding oil chemistry for crate engines, a high operating temperature and shorter drain intervals in dirt racing lessen the need for a high level of detergents in the oil.

“Detergents clean away dirt and deposits from oxidized oil and fuel,” he says. “Synthetic oils are more stable, so you don’t need a high level of detergents to keep the engine clean. And the engine is running hot enough to not worry about sludge.”

Driven’s XP9 and XP3 feature synthetic mPAO (metallocene polyalphaolefin) as a base oil, which has twice the viscosity index rating of conventional oil and allows for a lighter weight, but with the same protection. That equates to better cooling in crate engines that tend to run at higher operating temps due to their wet sump design.

However, it is recommended to change the oil filter on a crate engine after every race and add fresh oil, preferably synthetic.

“Crate engines are very underpowered for what the chassis is, and that results in a lot of open throttle time,” Speed says. “You need an

oil to handle the hard throttle. Synthetic is better than conventional or semi-synthetic because it is better at cooling."

The improved cooling is due to a synthetic oil's higher specific heat capacity, which also allows for the oil to absorb more heat from the parts it is protecting and cooling. Another temperature-related benefit of synthetic oil is greater oxidation stability, which means the oil is less likely to break down under high temps — up to 320 degrees versus 240 degrees for conventional oil.

Speed cautions against choosing a racing oil simply because it is synthetic and lower viscosity than what the factory recommends. Be sure to consider an oil's complete chemistry.

"By utilizing high viscosity index base oils and the proper level of ZDDP, a properly formulated 10W-30 can reduce wear compared to a 15W-50," he says.

Scientists use a viscosity index to rate the quality of different base oils, with conventional crude oil rating at 100 compared to synthetic mPAO (metallocene polyalphaolefin) at 200 — that's two times higher. Thus, formulations containing mPAO allow for a lightweight oil with the same protection as a higher viscosity conventional oil. Driven's XP9 10W-40 with mPAO as a base delivers the same sheared bearing oil thickness as a conventional 20W-50, for example.

In Driven's recent 602 crate engine inertia testing, the presence of wear metal iron was cut in half (from 4ppm to 2 ppm) with XP9 compared to the factory-recommended 15W-50 conventional oil. The amount of iron was further reduced to 1 ppm (a 75-percent decrease) when synthetic XP3 10W-30 was used. Refer to Fig. 1 for additional testing data, including ZDDP formulation

comparisons.

Source: Driven Racing Oil, drivenracingoil.com