TURBO DIESEL REGISTER

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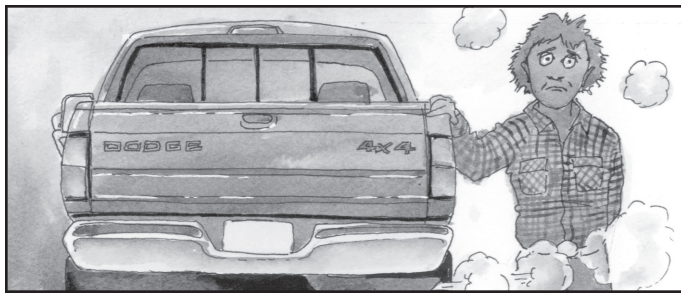

BACKFIRE

"Backfire" is a forum for corrections, clarifications, and further explanation. Yes, you're reading between the lines correctly. "Backfire" is a column where the editor gets to eat crow. This issue features a follow-up on lube oils written by Jon Martin.

FOLLOW-UP THOUGHTS ON ISSUE 116: OILS AND FILTERS

By John Martin

Because of all the discussions about oils, Issue 116 really got me spun up. But, before I get started, I need to apologize for my statement that, "I wouldn't use Oil #4 to lubricate my screen door hinges." I was merely trying to be humorous. Heck, I don't even have a screen door (or a good sense of humor). ***Editor's note: Obviously, I took John's "screen door" comment too seriously. Perhaps I'll go back to my established way of thinking: If the oil meets the existing API specification then it is a "good" product. Thus, lump all the products into the same category, commodity, and purchase on low price. Or maybe choose a brand name. I don't know…***

Quick Recap

Let me restate my thoughts on the oil data. Even though all the oils tested passed all the CK-4 test requirements, oil #4 (STP) had the least chemistry of the bunch. Oils 2,8,9, and 10 had the least EP (extreme pressure) protection, and Oils 2,3,4,10, 11, and 14 had the least detergency. Although these oils have the necessary credentials, I think there might be some field performance differences over time.

Rebranded Oils

Let's discuss the re-branded oils first. Rebrands usually don't have the reputations to protect that the majors do. So, some of them purchase the cheapest additive package that will pass the tests. My knowledge of Fram (#14) and STP (#4) support that theory. I also suspect Motorcraft (#11) and O'Reilly (#13) additive packages are also purchased on price alone. But the Walmart folks (#12) seem to insist on a better additive quality. I applaud them.

Lube Oil Analysis Chart

Sample Number	Manufacturer	Product	Viscosity @ 100°	TBN	Calcium	Phosphorus	Zinc	Magnesium	Boron	Molybdenum	Price	Notes
1	Shell	Rotella T6	14.8	7.43	1877	910	1066	77	180	2	29.99	5W40 Synthetic Group
2	Chevron	Delo 400 XSP	15.2	6.64	1323	697	796	663	101	1	29.99	
3	Mobil Delvac	ESP	13.7	10.1	936	1030	1225	805	133	47	32.99	
4	STP	Diesel Motor Oil	15.0	8.27	727	948	1120	928	64	53	26.99	
5	Shell	Rotella T6	14.5	7.62	2179	1055	1241	82	213	0	29.99	15W40 Synthetic Group
6	Royal Purple	Duralec Super	14.4	7.01	2522	996	1132	10	1	0	39.99	
7	Shell	Rotella T4	15.1	7.83	2111	968	1109	11	190	0	17.99	15W40 Mineral Group
8	Chevron	Delo 400 SDE	15.2	9.11	1555	775	899	666	366	133	15.18	
9	Mobile	Delvac 1300 Super	14.5	9.29	1597	749	886	474	67	39	18.99	
10	Valvoline/Cummins	Premium Blue	15.4	8.57	1121	691	829	736	46	44	14.99	
11	Motorcraft	Super Duty	15.4	6.45	1270	1021	1164	661	100	2	23.99	
12	Walmart	Super Tech	15.8	8.36	1695	1032	1218	369	5	46	13.32	
13	O'Reilly	Heavy Duty	15.4	7.36	1527	962	1124	549	426	135	13.99	
14	Fram	Heavy Duty	15.2	8.47	1049	1071	1283	904	1	61	18.99	

Major Brand Oils

Other factors are apparent in these analyses. Chevron (#8) has much higher Calcium (CA) detergent content than Chevron (#2). Likewise, Mobile (#9) has much more Ca than Mobil (#3). This suggests that both Chevron and Mobil emphasize diesel performance in their 15W40 mineral oils and gasoline performance in their synthetics. Here comes my theory again: Don't buy oils which have SN performance or state they are "gasoline engine compatible" for your diesels. Remember, SN oils have a "maximum" ZDP specification much lower than CK oils. Detergent and dispersant levels are higher in diesel oils. Diesel engines have to live for as many as one million miles while gasoline engines, at best, last only about 200,000 miles.

Issue 116 Writer Comments

I'd like to comment about statements made in Issue 116 by other TDR contributors. I want to compliment Heather Parks on her understanding of lube oils. And I want to comment on her statement, "Any brand of lube oil is better than no lube oil." In all my failure analyses over many years, far and away the most common lube-related cause of immediate engine failure was lack of oil, not oil quality.

Oil quality inadequacies usually result in significantly reduced engine service life, not immediate engine failure. Heather's five takeaways are also right-on! Here they are again:

- Is the oil you are considering using within the SAE specs (see owner's manual) and is it API certified? Is it the correct viscosity for the ambient temperature?
- Remember the marketing machines have an agenda so, ultimately, trust your common sense and best judgement.
- Change the oil using high quality filters, and at reasonable service intervals.
- Don't get too "wrapped around the axle" about the brand. Look at the lube oil analysis data (presented in the latest chart/evaluation on page 33) if you need the specifics.
- Feel secure looking at oil as a commodity.

On a side note, let's talk about air filter maintenance.

While at Cummins I took all their failure analysis courses. I once travelled to the Outback of Australia to analyze the short engine life of five Detroit Diesel 16V-92 powered generator sets in the Edjudina gold mine. These generator sets were placed downwind of the mine's rock crusher so a constant stream of abrasive dust particles fell on them. Air filter elements would plug after only one or two days. Vertical scratches on the piston ring faces told me these engines were being "dusted" causing excessive ring wear and high oil consumption.

The funny part of the whole adventure was the fact that the mine operators replaced the Detroit Diesel units with Cummins power. They replaced Mobil Oil with Valvoline. In that part of Australia both oils used the same Lubrizol additive package and the same Exxon base stock. I never did find out if they moved the new generator sets to the other side of the rock crusher as per my recommendations.

Andy Mikonis' comments were very interesting. Andy is correct that the most severe operating condition for a flat-tappet camshaft is initial break-in. Today's cam profiles are so severe that professional engine builders utilize break-in oils and reduced valve spring pressures when initially firing up a new build. Break-in oils came about when Joe Gibbs Racing asked me if oils could help alleviate the problem. The break-in oil was so successful that Comp Cams eventually purchased the entire Joe Gibbs line of oils (now Driven Racing Oils).

Andy's comments from his machinist friend are partially correct. Today cam lobe failures are most likely due to insufficient ZDP in the oil. Break-in oils provide double the amount of ZDP as gasoline engine oils. But don't use break-in oils or racing oils in continuous service. Detergents often compete with ZDP for the surface of the cam lobe, so these oils have minimum detergency to make the ZDP even more effective.

My team at Lubrizol created the "Hot Rod Oil" (it was my idea) for two reasons. First, to provide people with high-performance engines with a high ZDP oil having adequate detergency for reasonable oil change intervals. Secondly, we included rust inhibitors to prevent rust due to condensation in engines which sit idle for long periods of time.

I want to make a quick comment about oil change intervals. Time is not useful to determine oil change intervals in vehicles which see everyday service. However, oil (in particular detergents) will degrade with condensation in the engine due to ambient temperature changes. I change the oil in my street rods once a year regardless of mileage (I also agree that Cummins' 6-month change interval is excessive). ***Editor's note: I'll challenge John's "street-rod once a year" mentality: Okay, yes, change the oil if the street rod sits outside in a high humidity area with big temperature fluctuations. But I'm not spending any extra on oil changes on my vehicles that are stored in an inside warehouse. (Have you ever seen condensation on an unopened, gallon jug of oil? Me neither.) For the real truth: do an oil sample after the fact, but call me "too cheap" to spend money for the test.***

Finally, Moses Ludel's comments about lube oil filtration were excellent and right on the money. He did remind me of a bypass filtration experiment we ran with one of our test fleets. The fleet manager wanted us to run a bypass oil filter test in his fleet so he could extend service intervals. I told him we would do so, but only if he allowed us to include another variable: the bypass filter container with no filter element or media in it.

The results: The bypass filter did reduce wear metals, but the empty can proved almost as effective. How so? Since the existing sump held ten gallons of oil, and the new bypass filter housing held 2.5 gallons, the wear metals were reduced 25% due to the increased sump capacity. Remember, the solution to pollution is dilution!

John Martin
TDR Writer