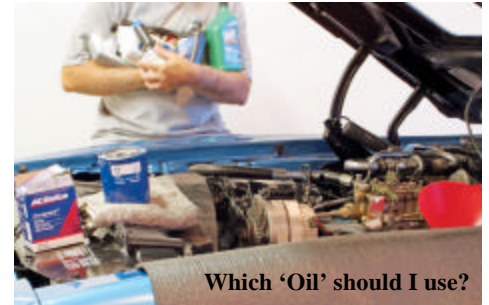


The Truth About Today's Oil and - What we as Opel owners can do about it. -

Back in January of this year I was made aware of the negative effects some modern motor oils have on our flat tappet camshaft engines, by my local engine builder. He explained to me that key anti-wear additives had been reduced from most of today's oils and that they were leading to camshaft lobe and lifter failures. He strongly urged me to purchase a few bottles of Comp Cam, Camshaft Break-In Oil Additive and use it to not only break-in the new engine but to keep using it with each oil change.

This led me to do some research on my own and determine the validity of his claims. To my astonishment, I found this topic to be a hot-button issue and a cause for great concern by most car owners. The reformulation of engine oil, to meet modern emissions requirements, was causing problems for many vintage car owners, cam and lifter manufactures, engine builders and owners alike. This topic was discussed by Porsche owners, MG owners, Chevy and Ford owners, etc. I was happy to find that many oil companies were aware of these problems and have begun to address them.



In the following pages, I have what industry experts had to say on the topic, what they were doing to help us and 'what engine oils' & 'oil additives' they recommended. The list is not intended to be exhaustive, but should give our readers a good overview. I also encourage our readers to further educate themselves on this topic. **Dennis G.**

Amsoil

AMSOIL was the first company to market fully synthetic motor oils for all types of internal combustion engines. Its first gasoline engine offering was released in 1972, which spawned an entire industry.

AMSOIL's Director of Advertising, Ed Newman was asked:

Does your company offer any products intended for use with flat tappet camshafts?

'We offer a full line that contains an extreme pressure additive package that have a proven history. Products like our (AMO) 10W-40 and (ARO) 20W-50 gasoline-engine oils contain high ZDDP levels, and are perfectly suitable for flat-tappet cams.' 'We're very committed and are actively pursuing ways to specifically market these lubricants to classic car hobbyists.'

Shell Rotella T

Designed for the harsh environment within a diesel engine, Shell ROTELLA T has aptly earned the reputation as a high quality, maximum protection lubricant. With reformulation of gasoline engine oil a few years ago, many hobbyists with flat tappet camshaft engines have found salvation in commercial grade oils like ROTELLA T, which have typically maintained high levels of the desirable anti-wear additives. Current ZDDP levels are 1,200 ppm.

Shell's OEM Technical Service Manager, Stede Granger, was asked:

You're likely aware that ROTELLA T is used by many automotive hobbyists with flat tappet camshafts. Are there any negative effects when using ROTELLA T in gasoline engines?

For older gasoline engines that are no longer under warranty, and emissions aren't a concern, there are no major negative effects when using ROTELLA T. In fact, it carries an API S series rating. The only possible concern I see is viscosity, 15W-40 will not circulate as quickly during initial start up in 'extremely cold' weather. In these harsh situations 5W-40 synthetic is then an option.

Is there any chance your company could reformulate ROTELLA T in the near future, and drastically reduce its high zinc content?

'A point to remember is that zinc not only protects flat tappet camshafts against wear, but also any high pressure metallic surface that relies on pressurized oil for lubrication, such as the piston rings, cylinder walls, and rocker arms/pushrods. When oil can't carry the load, zinc steps up and creates a chemical barrier, and the high levels of zinc in commercial grade oil contribute to the fact that some diesel engines run a million miles or more. I don't see us reducing the zinc content in ROTELLA T unless an organization like API imposes a lesser chemical limit on a subsequent category. **Note:** Rotella T is also recommended by the Porsche owners club.



"If you're currently putting mileage on your classic vehicle and using the latest API grade SM oil, you are almost certainly doing irreversible damage to your engine."

William C. Anderson, 'New Oils and Old Cars', Old Cars Weekly 48 (2007-08030)

ZDDP Additive

After 70+ years of trouble free, metal-to-metal engine protection, the E.P.A. is forcing ZDDP (Zinc Dialkyl-Dithio-Phosphate which is, Zinc and Phosphorus) from domestic motor oil. Our Opel engines were designed with conventional solid or hydraulic flat tappets (lifters) which require the friction modifier ZDDP in the engine oil to avoid premature deterioration.

ZDDP is a surface modifier that alters bearing and journal surface characteristics to prevent metal-to-metal contact. Under high rpm (3000+ rpm) heat and pressures quickly increase, the ZDDP molecule quickly plates over the contact surface with an extremely thin glass-like film and provides a sacrificial coating. As soon as the engine conditions get back to normal, the film dissipates back into the oil solution. This action prevents the lifter and cam from making contact and greatly reduces the tendency of parts to scuff under the heavy-load boundary lubrication situations.

Camshafts and lifters found in the our older Opel engines definitely fit this category. These high load conditions also exist in the piston wrist pins. In other words, this description clearly fits the characteristics of our engines.

Back before 1988, normal amounts of ZDDP could be found in our domestic engine oils. The API grade "SG" oils contained in excess of 0.12% ZDDP by weight. The API grade of oil prior to this was "SF" and had concentrations in excess of 0.15%.

For more than 38 years, it was possible to buy E.O.S. {Engine Oil Supplement} from GM in a 16 ounce bottle. **Note:** E.O.S. was even mentioned in the 1969 Opel Owner's Manual, as being available at your local Buick dealer. Unfortunately E.O.S. was withdrawn in the second quarter of 2007. However, as of this writing it appears, E.O.S. may be making a comeback at GM dealers.

GAS ENGINE OIL SPECIFICATIONS

Oil Grade Category	Availability Status	Specifications
SM	Current	For all current vehicle engines
SL	Current	For engines 2004 and older
SJ	Current	For engines 2001 and older
SH	Discontinued	For engines 1996 and older
SG	Discontinued	For engines 1993 and older
SF	Discontinued	For engines 1988 and older
SE	Discontinued	Not acceptable for gasoline-powered vehicles engines made after 1979
SD	Discontinued	Not acceptable for gasoline-powered vehicles engines made after 1971

You may be asking: Why reduce ZDDP levels out of engine oil, if it can cause so much harm to flat tappet engines?

The EPA has required new car manufacturers to guarantee catalytic converters for over 100,000 miles. So oil companies have been forced to drastically reduce ZDDP levels because today's car manufacturers now have to warranty catalytic converters for over 100,000 miles. It seems ZDDP may actually shorten the life span of the catalytic converter, raising warranty issues. Also, since modern cars now have roller lifters, it eliminates the need for ZDDP.

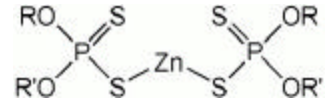
The vehicles that fall through the cracks are the older performance and classic cars, which include our Opels.

ZDDP QUESTIONS & ANSWERS

What is ZDDP?

ZDDP is an oil additive, known as Zinc Dialkyl-Dithio-Phosphate, which has been the primary Extreme Pressure ingredient in all quality motor oils for over 70 years.

The ZDDP Molecule

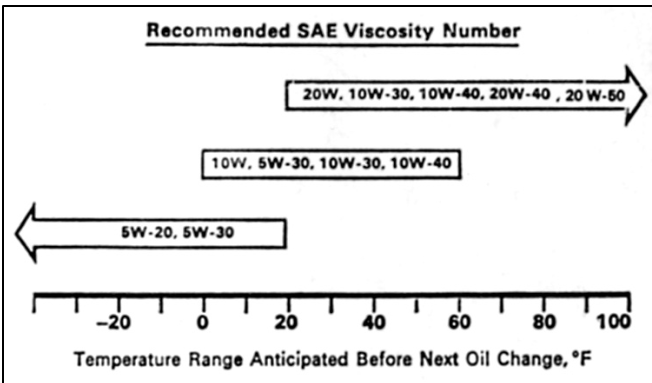


Why do I need ZDDP?

The EPA has put stricter emission requirements on new cars, which have influenced manufacturers to remove ZDDP from motor oils. Opel specified 'SE' high quality engine oils and made specific mention to use detergent oils. The modern 'SM' grade oils have greatly reduced amounts of these Opel specified qualities.

ENGINE OIL RECOMMENDATION - Use only high quality SE oils. The chart below will serve for selecting proper oil viscosity.

API Label



What do the oil grades such as SE, SF or SM indicate?

In the API { American Petroleum Institute } Classification System, "S" and "C" are the two basic application categories of oil. "S" is intended for gasoline use and "C" is intended for diesel use. "A" was the first grade in each category and resulted in "SA" and "CA" grade oils. Each progressed farther up the alphabet as new grades of oil were introduced. The newest grades are "SM" and "CJ" respectively.

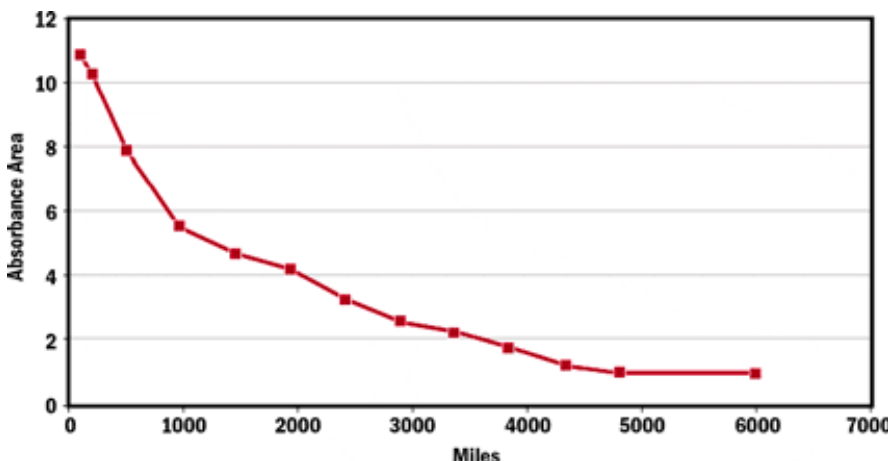
Aren't the newer oils better than the older oils?

Historically, every new grade of oil introduced since the 1930s was better than the previous grade and could be considered "improved" with one exception. The original SA grade was straight mineral oil (non-detergent and without additives) and SB contained additives, which could not be used in the earliest cars specified for SA. While it is true that SM oils are better for newer cars, they are not better for older cars. Simply put, the newer and/or better oils are not backward compatible for older cars, primarily due to the gradual reduction of ZDDP starting with SG grade in 1988.

How much ZDDP should I have in my Opel's engine oil?

ZDDP is most effective if the concentration is between 0.18 % and 0.20 % by weight. Higher ZDDP concentration has no effect except to prolong additive life.

Opel also noted in the '**Opel Maintenance Schedule**' that the oil should be changed every 3000 miles if any of the following severe driving conditions were experienced: **A.** the excessive idling {stop-and-go traffic}, **B.** short trip operation in freezing temperatures, **C.** driving in dusty conditions or **D.** trailer pulling.



The chart above is a good illustration of engine additive depletion experienced during 'Optimal' engine operation, and not 'Severe Service' operation as described above.

But My Engines Stock! I don't drive hard, What's the big deal?

Engines with flat tappet cams have extremely high pressure loading at the contact point between the lifter crown and the cam lobe. According to Mark Ferner, from Quaker State Motor Oil Research and Development, "**Even stock passenger cars can see pressure in excess of 200,000 psi. at the point of lifter and cam lobe contact.**" To prevent excess wear, traditional motor oil included a generous dose of anti-wear additives, primarily zinc-dialkyl-dithio-phosphate ZDDP.

Brad Penn



Industry experts have long considered Pennsylvania grade crude oil among the best in the world, and one of the most popular engine oils refined from it was Kendall GT-1. The American Refining Group now operates the Bradford, Pennsylvania based refinery. Brad Penn's Penn Grade 1 (PG 1) is available as a partial synthetic or conventional engine oil, and in varying viscosities.

Of Director of Branded Lubricants Sales and Marketing, Dick Glady, it was asked:
Are Brad Penn's Penn Grade 1 products intended for use with flat tappet camshafts?

Yes, PG 1 has been evaluated by a number of camshaft manufacturers, and is now recommended by many for flat tappets (a.k.a. "solid valve lifters"). We add to it a high concentration of ZDDP, and our additive package, the result is high quality race oil that offers outstanding anti-wear and anti-scuffing protection for flat tappet cams. We also offer Penn Grade 1 Break-In Oil a specially formulated, 30 weight oil developed for flat tappet camshaft break in, and features enhanced levels of ZDDP.

Is there a specific amount of ZDDP that your company feels is the minimum required for flat tappet camshafts?

Our typical ZDDP content is 1,200 ppm. Our lubricant is actually a uniquely formulated race oil that's suitable for older flat tappet camshaft engines, and it offers additional engine protection beyond high levels of ZDDP.

Where can hobbyists purchase Brad Penn products?

Penn Grade 1 products aren't available through local retailers. Instead, present distribution goes through select independent lubricant wholesalers, engine builders, and specialty racing/performance outlets. Contact us via our Web site, and we'll reply with the nearest authorized Brad Penn Racing distributor.

Comp Cams - Cam Manufacture -



COMP Cams is a well-known aftermarket camshaft manufacturer. With word of oil reformulation buzzing about, Comp Cams has addressed this issue.

Comp Cam's Tony McCurdy was contacted and asked:
Is current oil formulation an area of concern for COMP Cams?

Yes, definitely. Because of tightening environmental regulations, modern engine oil isn't the same as it was just a few years back. The federal government recently required the reduction of key ingredients such as zinc and manganese in all types of gasoline and diesel engine oils, which continues to plague flat tappet camshaft engines.

What Break-In procedure does Comp Cams recommend?

Proper engine break-in is a key element in the longevity of any flat tappet camshaft. We strongly recommend that the new flat tappet camshaft and its lifters be liberally coated with our No.153 Cam & Lifter Installation Lube. We also suggest adding a 12 ounce bottle of our No. 159 Camshaft Break-In Oil Additive to the crankcase. As soon as the engine fires, increase the rpm to 2,000 to 2,500 rpm for the first 30 minutes of operation, while periodically varying the rpm to ensure direct splash oiling on all areas of the camshaft.

After the break in process is complete, we suggest changing the oil and filter to remove contaminants, filling the crankcase with the customer's choice of high quality conventional or synthetic oil, and adding a fresh bottle of our No. 159 Camshaft Break-In Oil Additive.

You suggest Cam-shaft Break-In Oil Additive for long-term use. Can you explain the advantages?

The product was initially developed specifically for break-in protection, but subsequent testing has proven long term durability benefits for flat tappet cams. It contains a special blend of additives that replace some of the desirable ingredients that the oil companies have removed from modern oil, and protects the camshaft and lifters against premature wear.



Shown at Right:

Typical Cam Shaft Lobe and Lifter damage.

What about STP Oil Treatment?



STP ("Scientifically Treated Petroleum") is a well known brand in the United States with a long automotive history.

The reference to ZDDP on its label suggests that STP (now owned by Clorox) could be the most widely distributed and the most conveniently available additive.

Of STP's Media Liaison/Technical Advisor, OMC asked:

STP Oil Treatment claims on its label that it 'Contains ZDDP', can you state how much ZDDP is in your product?

STP Oil Treatment and STP 4 Cylinder Oil Treatment contains 1 to 1.5% of the ZDDP additive per bottle.

For clarification, if STP Oil Treatment was to be added to 4 quarts of the standard current grade SM engine oils, which is regulated to 870 parts per million ZDDP, can you tell me what the overall ZDDP levels will be, and would that level be safe for engines requiring SE grade oils?

Response: Unfortunately, we do not have that specification.

After this brief conversation speaking with STP's technical representative, I regret to inform readers that I can not endorse using STP (for ZDDP additives) over other specialty products.

CRANE CAMS
Camshafts



Crane Cams - Cam Manufacture-

Crane Cams has been a flat tappet camshaft manufacturing leader since the early '50s, and though the company has ventured into various other valve train and ignition related components over the years, camshafts remain among its most popular products. Like any camshaft manufacturer, Crane Cams admits that today's oil formulation is an area of concern.

Of Tony Vigo, Crane Cams' Media Liaison and Technical Advisor, it was asked: Is current oil formulation an area of concern for Crane Cams?

Yes, the reduction of the zinc phosphorus compound (ZDDP) from most modern engine oil has definitely accelerated flat tappet camshaft & lifter wear.

Have these changes affected the way your company manufactures flat tappet cams? Or has your company changed your recommendations regarding Break-In procedures?

No, not at all. Our flat tappet camshafts remain a popular hobbyist choice, and to ensure longevity, we are recommending specific break in procedures using products like Brad Penn motor oil, or such diesel specific oils as Shell ROTELLA T, Mobil Delvac, and Chevron Delo 400. We recommend that each lobe and lifter be thoroughly coated with our No. 99004-1 Super Moly Assembly Lube, and to combine said oil with an 8 ounce bottle of our No. 99003-1 Super Lube Break-in Concentrate. After setting valve lash or lifter preload and priming the fuel and oil system start the engine and immediately begin cycling its speed from 1,500 to 3,000 rpm for 20 to 30 minutes. If the camshaft requires dual valve springs, we suggest removing the inner spring during break-in. Once the process is complete, the camshaft should be ready for normal use.

What are your suggested oil change practices during normal use?

We recommend that the first oil change occurs within 500 miles of initial break-in, and then follow that with normal oil change intervals that include any high quality engine oil, and at least 4 ounces of our Super Lube Break-In Concentrate.

General Motors - E.O.S.



General Motor's E.O.S. anti-wear additive containing a high concentration of ZDDP that's designed to protect the camshaft lobe and lifter against scuffing and wear during break in. When used moderately at each oil change, it has little effect on emissions equipment, and greatly enhances the long term life of the cam.

Conclusion

Myriad other lubricant companies and camshaft manufacturers have certainly addressed these issues and developed their own solutions, but it was not practical for us to contact all of them. After hearing a recurring trend from those we spoke with, we are confident that answers from most others would closely follow what was presented here.

We learned that current spec commercial grade oil, like ROTELLA T, remains a suitable off the shelf lubricant for Opel owners. Other options include specialized lubricants like those from Brad Penn, or to combine modern spec gasoline engine oil and an additive such as that from COMP Cams or Crane Cams.

While it's still recommended to follow your engine builder and/or camshaft manufacturer's specific suggestions for break in and long term use, Opel owners can rest easier knowing that a variety of solutions are presently available, and after hearing what these companies have to say, we are confident that we can safely drive our Opels without feeling as if our camshafts are living on borrowed time.



Above: Quaker State 'Q' Racing Oil, Mobil Delvac 1300 & Chevron Delo 400 diesel engine oils.

ZDDP CONTENT

API Oil Designation/Brand	Year	Zinc	Phosphorous
SH	1996	0.130	0.120
SJ & SL	2001-04	0.110	0.100
SM	2005	0.087	0.080
Shell Rotella T	2006	0.140	0.130
Pennzoil 20W50 Racing	2006	0.196	0.180
Quaker State Q Racing	2006	0.200	0.180