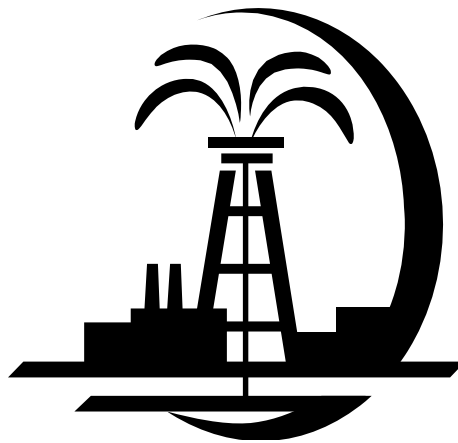


OYL

WHATS IN YOUR PAN?



DISCLAIMER

- While the material presented here is thought to be from reliable sources the content is not guaranteed.
- If you are driving a recently rebuilt engine, or a high performance cam, follow the rebuilders or cam manufacturers recommendation.

MY QUALIFICATIONS

- Around oil most of my life
 - JOHNSONS BABY OIL
 - CASTOR OIL
 - BREYLCREME
 - VASOLINE
- Fuel and Lube Classes
- Did not stay at a Holiday Inn

REMEMBER THE GOOD OLD DAYS?

- Pennsylvania Crude-(Paraffin Base)
 - Pennzoil, Quaker State, Kendall (2000 mi), Wolfs Head
- Texas Crude
 - Havoline (Ask the man who wears the star), Conoco, Sinclair (Wyoming)
- California (Asphalt Base)
 - Richfield
 - Gilmore
 - Chevron
 - Royal Purple
- Detergent-Non-Detergent
- 10W-30, 5W-20

MORE THAN I EVER WANTED TO KNOW

- DINO OIL—NOTHING TO DO WITH DINOSAURES (Marine Planktons, Diatoms)
- SYNTHETIC OILS—STILL BASED ON OIL/NG DERIVITIVES PAO (polyalphaolefins)

WHAT IS ADDED TO OIL?

- Antioxidants
- Dispersants
- Anti wear
- Anti foam
- Anti corrosion
- Lubricity
- Detergents
- Viscosity Modifiers
- Seal swell agents
- Corrosion inhibitors
- Friction modifiers
- Control oxidation
- Sludge and varnish control
- Control valve train wear
- Foaming
- Iron corrosion
- Wetting
- Clean
- Control Temperature thinning
- Stop leaks
- Non-iron corrosion
- Reduce or increase friction

WHAT'S THE BIG DEAL?

- Older flat tappet engines need an anti-wear agent to reduce metal to metal wear.
- ZDDP (Zinc Dialky-Dithio-Phosphate)
- After 40-50 years what happened?
- Phosphorus affects the life of Cat Converters and the requirement to get to 150k miles life.
- Phos. Is reduced in oils designed for current engines That have overhead cams or roller lifters (API SM/ CJ4)
- Lost backward compatibility

WHAT OIL DID GM SAY TO USE IN THE 1970'S

- Oil rated API-SE
 - API note: SE not suitable for engines built after 1979
 - The SE additive package was designed to resist oxidation. corrosion and sludge.
 - SF rating 1980, added wear protection (.05% phos. .075% zinc?)

ZDP vs LIFTER LOAD

- API Scuffing lifter, cam tests indicates .08% ZDP showed no scuffing up to 600 lb lifter load.
- 455 Engine loads estimated at about 400lb
- Current SM Rated oil Should work with well broken-in stock engine
 - Are current aftermarket cams and lifters equal to OEM?
 - Are assembly processes equivalent?

WHAT DO WE WANT? ONLY THE BEST

- Oil with Phosphorus and Zinc in the 1000-1400 range
- API rating includes SL and/or CF4
- No starburst API symbol
- Some Brands
 - Mobile 1 15-50 Valvoline
 - Castrol Syntech 15-50 NAPA 20-50
 - Redline
 - Royal Purple
 - AMSOL
 - SWEPCO
 - Brad Penn
- Oils with upper viscosity of 40 or higher can have more than 800ppm of ZDDP

WHAT ABOUT ADDITIVES?

- More is not better, beyond 1400 ppm -1800 ppm detergents, viscosity and galling are affected
- Know where you are
- Additives won't bring 800 ppm oils into the desired range without affecting other additives
- Additives include:
 - ZDDPLUS, GM EOS, Snyder Cam, STP red, on and on.

WHAT ABOUT DIESEL OILS?

- Later API (CJ) grades have reduced ZDDP.
- Diesel oils have an additive package designed to remove soot, high detergent, that can effect oil cling and washdown. Remember diesel fuel is a lubricant.

Dick Patterson Recommendations

- Rebuilt Engine: Assembly lube on all parts, No rotation. Initial break-in Rottella, Mobil 1 for continuous service.
- J. Bounds approach- Roller lifters, ZDDP additive.
- COMP Cams
 - Nitride the cam
 - Groove the lifter bore (tool available)
 - Assembly Lube and Comp additive for break-in



QUAKER STATE 110 MOTOR OIL

S.A.E.

20-20W

M.M. - M.S. - D.C. - D.M.
EXCEEDS CAR MANUFACTURERS TESTS

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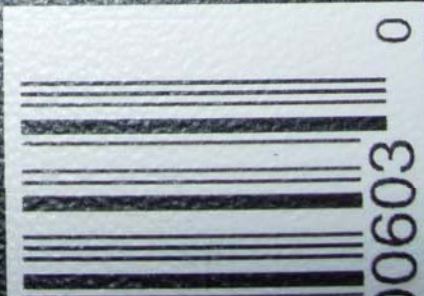
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 Cummins CES 20071, 76, 78
 Detroit Diesel 93K214
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Construction equipment including: Caterpillar, Case, John Deere, Komatsu and others



Diesel and gasoline cars



Follow engine manufacturer's recommendations for specific performance and viscosity requirements. **Not suitable for use in 2007 model year diesel engines.**

WARNING: CONTINUOUS CONTACT WITH USED GASOLINE ENGINE OILS HAS CAUSED SKIN CANCER IN ANIMAL TESTS. AVOID PROLONGED OR REPEATED CONTACT WITH EYES, SKIN AND CLOTHING. WASH SKIN WITH SOAP AND WATER AFTER HANDLING.
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