Racing Oil 101

It has to be the best.

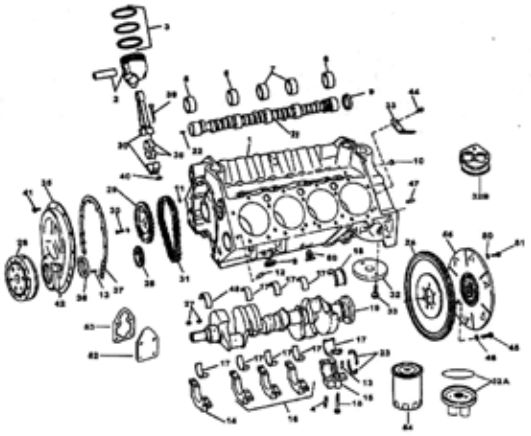
What Does Oil Do?

Reduces Friction

The primary function of a lubricant is to reduce friction, which in turn reduces wear, saves power and reduces heat.

Provides Cooling

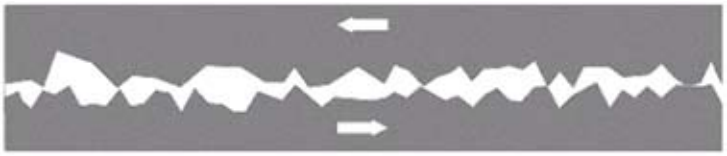
Oil also serves as a coolant. It carries away heat from moving parts as it circulates around the engine.



How Does It Work?

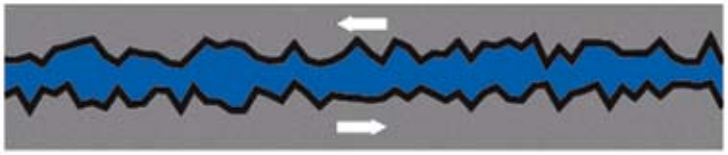
As Load Increases, Lubrication Moves From Full Film (Hydrodynamic) To Boundary Lubrication

No Oil
High Friction -
High Wear



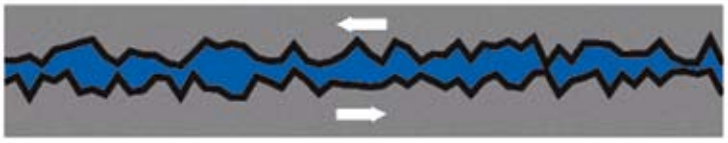
No Lubrication - Dry Surfaces in Direct Contact

Lightly Loaded



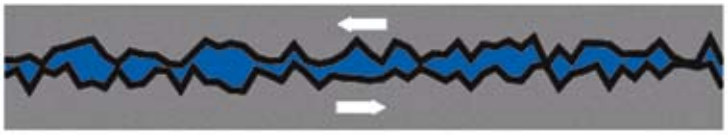
Full Film Lubrication - Oil Film Fully Separates Surfaces

Moderate Loaded

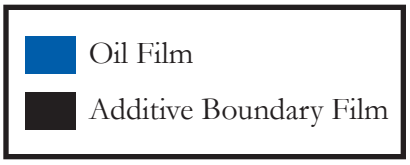


Mixed Film Lubrication - Both Oil & Boundary Film Play a Role in Lubrication

Heavily Loaded



Boundary Lubrication - Performance Completely Dependent on Boundary Film
Additive film wears instead of metal surfaces.

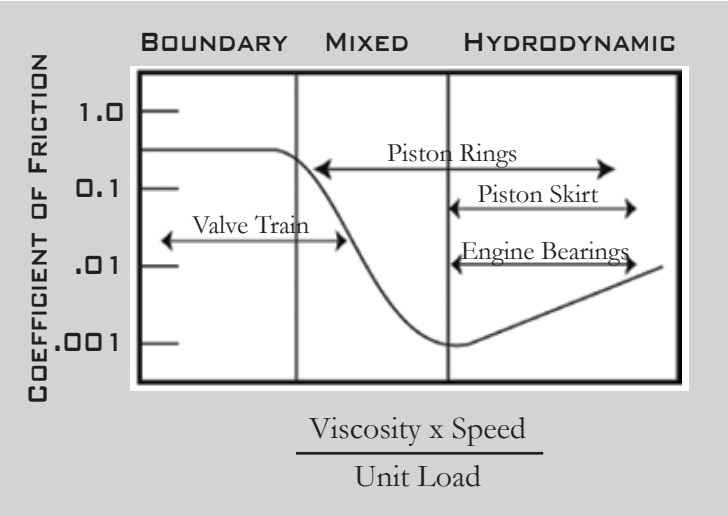


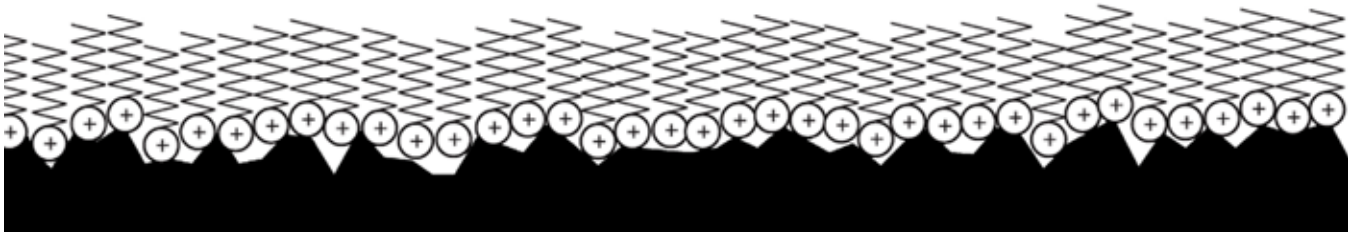
How Does It Work?

In heavily loaded applications – a flat tappet cam and racing engines - an oil wedge can not be sustained. As a result, metal to metal contact will occur unless a sacrificial coating is formed.

ZDP (aka Zinc) and Moly (MoS2) are polar molecules, so they are attracted to carbon steel surfaces where they react with heat, to create a sacrificial additive coating. The protective coating prevents metal to metal contact, which reduces friction and wear. Moly can withstand pressure up to 500,000 psi.

Key Protection For:
Lifters, Push Rods and Wrist Pins
Distributor Gears, Bearings, Etc…





Significant Properties

To achieve maximum lubricant performance, an oil must be formulated to meet the specific need of the application. These are the building blocks of an oil. What parts you use and how you put them together determines how the oil will perform.

Viscosity – Viscosity is a measure of flow

Viscosity Index – An oil's resistance to thinning as temperature increases

Pour Point (low temperature cranking)

Oxidation Resistance
(high temp stability)

Additive Package
- Anti-Wear & EP protection (Moly & Zinc)
- Friction Reduction (Moly & Zinc)
- Detergents (Calcium & Boron – Cleans the engine)
- Total Base Number – Acid Neutralizers

Base Oil Choice (Group I, II, III, IV, & V)
- Group I, II & III are mineral oils (increasing purity)
- Group IV & V are synthetics (completely pure)

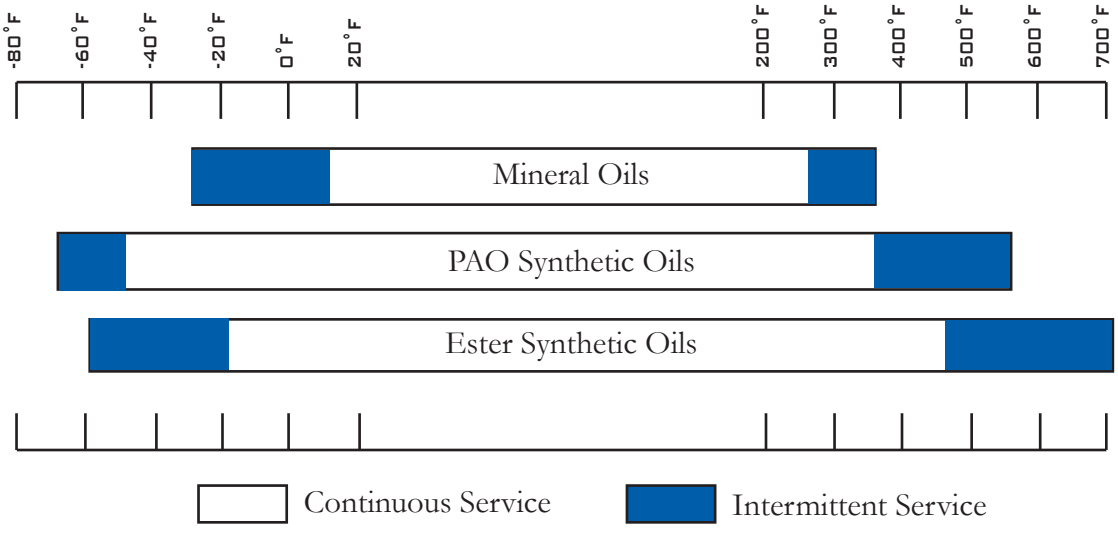
Synthetic vs. Mineral

The difference between synthetic and mineral oils are the structure of the molecules and the purity of the oil. Refined crude oil contains complex mixtures of different molecular structures and saturates (Nitrogen, Sulfur and Oxygen). There is no way to select only the best materials from this mixture. Thus mineral oils contain both the most suited materials and the least suited materials for an engine oil. Synthetic oils are man made, and have tailored molecular structures with predictable properties. Because of this, synthetics can have the best properties of a mineral oil without the un-desired materials.

Synthetic oils have two unique advantages over mineral oils – lower traction coefficients and higher oxidation stability. This translates into improved energy efficiency – less friction - and longer drain intervals.

Synthetic	Advantage vs. Mineral
PAO	High Temp Stability Improved Wear Protection Long Life High Viscosity Index
Ester	High Temp Stability Long Life Solvency/Detergency Low Temp Fluidity

Operating Temperature Limits



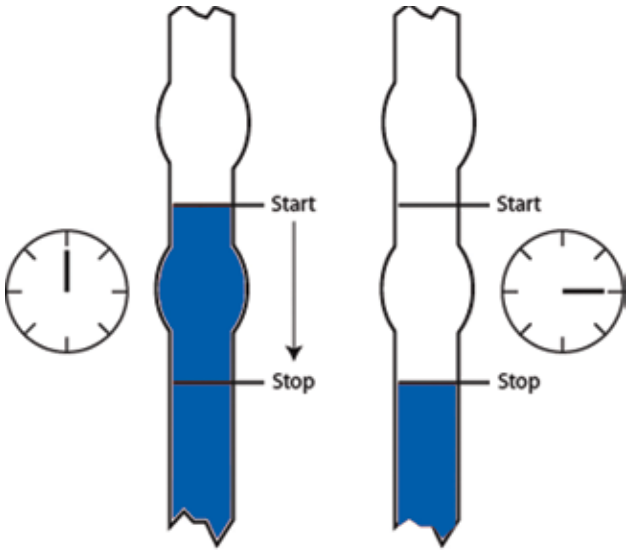
What Is Viscosity?

Viscosity is a measure of flow. Oil viscosity is generally thought of in terms of SAE grades, like 15W-50.

- SAE grades are ranges, not an exact measurement of an oil's flow rate.
- Kinematic Viscosity measures the exact flow rate of an oil at both low and high temperature.
- An oil's flow rate increases as temperature increases.

KINEMATIC VISCOSITY FLOW TEST

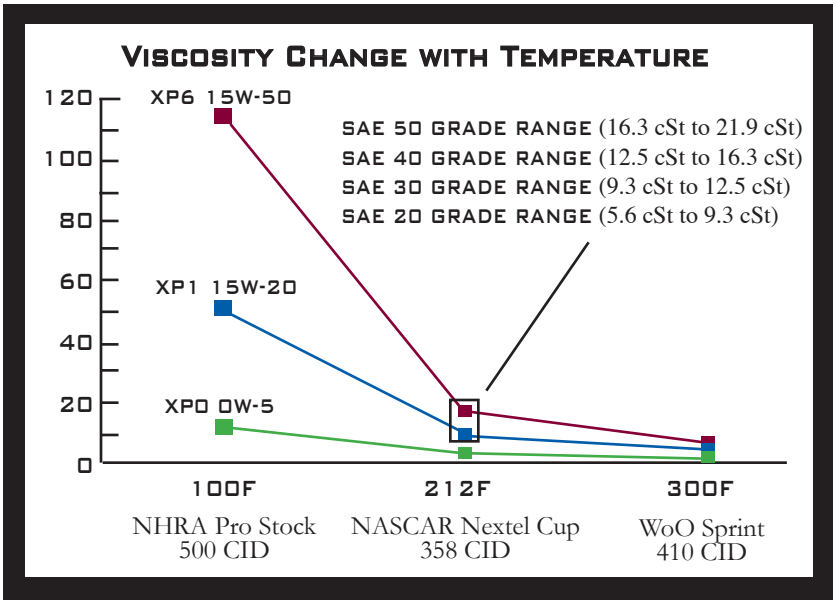
Oil Flow is Tested @ 100F and 212F



The time it takes to drop from start to stop is measured in Centistokes. The higher the number, the slower the flow. The lower the number, the faster the flow.

Operating Viscosity

The "Operating" Viscosity Is The Centistoke Flow Of An Oil At The Operating Oil Temperature Of An Engine. Some engines run low oil temperatures, and other engines run extremely high temperatures. Low viscosity oils work well in low temp applications, and high viscosity oils work well in high temp applications. In fact, the operating viscosity of the XP0 in a NHRA Pro Stock engine, the XP1 in a NASCAR Nextel Cup engine and the XP6 in a World Of Outlaws 410 Sprint engine is within 5 centistokes of each other.



The viscosity of the oils are different. The operating temperatures are different, but the operating flow rates are very similar.

Oil Today vs. Yesterday

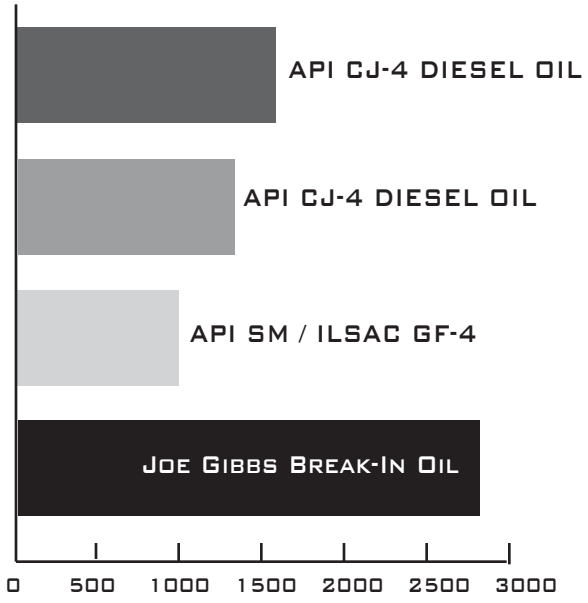
Today's engine oils are not the same as they were even a few years ago due to clean emissions regulations.

API & ILSAC

- Sets the standards for oil specifications
- Works with Auto Mfg's & EPA

Phosphorus and Zinc Reduction

- Phosphorus degrades catalytic converters
- Zinc & Phosphorus content unlimited before 1996
- Zinc & Phosphorus now limited to max 800 ppm
- Diesel oils now limited to 1,200 ppm Phosphorus (Oct. 2006)
- European and North American standards are set to change again in 2010



Zinc Content PPM (part per million)

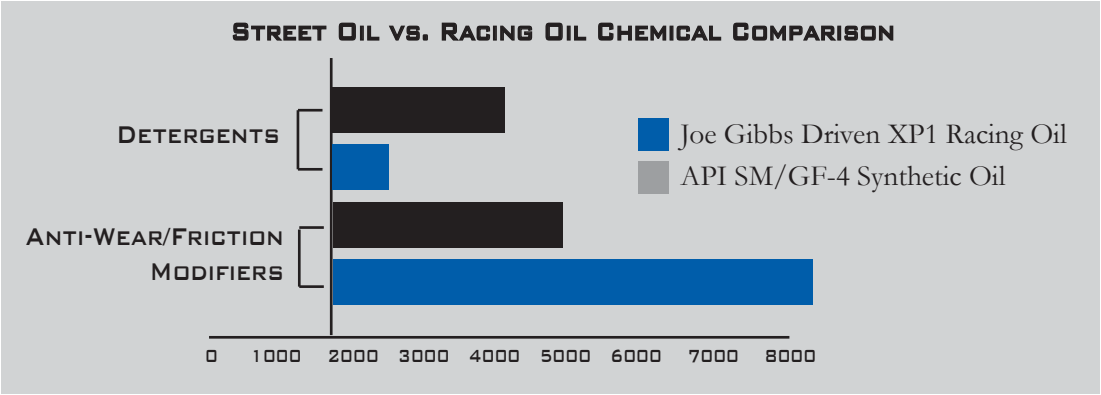
Racing Oil vs. Street Oil

Modern Engine Set-Ups

- Low RPM (Low Load - Less Need For Anti-Wear)
- Overhead cams (No Flat Tappets or Push Rods – Less Need For Anti-Wear)
- Extended Drain Intervals (increased detergents & acid neutralizers)

Race Engine Set-Ups

- High RPM (High Load – More Need For Friction Modifiers)
- Flat Tappet cams and Push-Rods – More Need For Anti-Wear
- Short Drain Intervals – Needs Fewer Detergents



Hot Rod Oil

Purpose Built – Unique Formula

- Designed to protect flat-tappet cams & push rod engines
- Provides rust & corrosion protection while car is in storage – US Military grade corrosion protection
- Formulated to handle daily driving and racing conditions
- Full synthetic formula provides excellent cold-start protection
- 3,000 mile drain intervals
- Perfect for restoration cars, muscle cars, and hot rods
- Available in 15W-50 Grade and 10W-30
- Retail price - $9.99 (Jobber $6.99)