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ENGINE OILS, TRANSMISSION OILS AND FUEL TREATMENTS

PREMIUM



GLOSSARY

Glossary of terms and abbreviations etc. used in Millers Oils documents and communication.

| Term | Explanation |
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| Abrasion | “The wearing, grinding, or rubbing away by friction. Abrasion is usually due to the presence of foreign matter such as dirt, grit or metallic particles in “ |
| Absolute Viscosity | The product of Kinematic Viscosity and Density. |
| ACEA | Association of European Automotive Manufacturers |
| Acid | Corrosive solution formed by the combination of hydrogen and oxygen atoms with metal or metallic radicals. Acidic solutions may be neutralized with a base or alkaline solution. |
| Acid Number | A measure of the amount of KOH needed to neutralize all or part of the acidity of a lubricant |
| Additive | “A chemical added in small quantities to a base fluid in order to improve specific properties of the lubricant such as fluid life, lubricity, wear protection, rust protection, etc..” |
| Adhesion | “The property of a lubricant that causes it to cling or adhere to a solid surface. Wear occurring when surfaces contact, weld together and shear off.” |
| AGMA (American Gear Manufacturers Association) | The organization responsible for the establishment and promotion of gear lubricant standards. |
| Air Entrainment | The incorporation of air in the form of bubbles dispersed in a fluid. Common when an improper amount of anti-foam agent is added to reduce foaming. |
| Ambient Temperature | Temperature of the air surrounding the point of application. |
| Anhydrous | Free of water. |
| Anti Wear Agent | “An additive that minimizes wear caused by metal-on-metal contact by forming a film on the metal surfaces, typically activated by heat and pressure.” |
| Anti-Foam Agent | An additive that causes foam to dissipate more rapidly. It promotes the combination of small bubbles into large bubbles which burst more rapidly. |
| Antifreeze | Solution in an engine cooling system that lowers the coolants freezing point and raises its boiling point. |
| Anti-Oxidant | A chemical added in small quantities to a petroleum product to increase its oxidative resistance in order to prolong its service life. |
| Anti-Wear Agent | “An additive that minimizes wear caused by metal-to-metal contact during conditions of mild boundary lubrication (e.g. stops and starts, oscillating motion). The additive reacts chemically with, and forms a film on, metal surfaces under normal operating conditions. “ |



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| Term | Explanation |
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| API (American Petroleum Institute) | “A society organized to further the interests of the petroleum industry. It serves to clear information, conduct research, improve marketing conditions, etc. One of the Institute’s activities has been the development of the API Service Classifications for crankcase oils, and rules for Base Oil Interchange, which give rise to Base Oil Groups I-V. “ |
| Apparent Viscosity | A measure of the viscosity of a non-Newtonian fluid under specified temperature & shear. Viscosity is expressed in units of centipoise (cP). |
| Aromatic | “Cyclic unsaturated hydrocarbons identified by one or more benzene rings or by chemical behaviour similar to benzene. Aromatics are usually more reactive and have higher solvency than paraffins and naphthenes. Aromatics readily undergo electrophilic substitution; that is, they react to add other active molecular groups, such as nitrates, sulfonates, etc. Aromatics are used extensively as petrochemical building blocks.” |
| Ash | Metallic deposits formed in the combustion chamber and other engine parts during high temperature operation. |
| Ash (Sulfated) | “The ash content of an oil, determined by charring the oil, treating the residue with sulfuric acid, and evaporating to dryness. Expressed as % per mass.” |
| ASLE (American Society of Lubrication Engineers) | “The former name of an organization involved with friction, wear, and lubrication, now known as the Society of Tribologists and Lubrication Engineers (STLE). “ |
| ASME | American Society of Mechanical Engineers |
| Asperities | Microscopic projections on metal surfaces resulting from normal surface finishing processes. Ideally the lubricating film should be thicker than the combined height of the opposing asperities. |
| ASTM (American Society for Testing and Materials) | “The organization devoted to “the promotion of knowledge of the materials of engineering, and the standardization of specifications and methods of testing.”” In North America, a preponderance of the data used to describe, identify, or specify petroleum products is determined in accordance with ASTM Test Methods. “ |
| Auto-Ignition Temperature | Minimum temperature at which a combustible fluid will burst into flame without the assistance of an extraneous ignition source. This temperature is typically several hundred degrees higher than the flash and fire point. |
| Automatic transmission fluid (ATF) | “A functional fluid for automatic transmissions in motor vehicles. Automatic transmission fluids must have a suitable coefficient of friction, good low-temperature viscosity, and antiwear properties. Other necessary properties are: high oxidation stability, anti-corrosion, anti-foaming, and compatibility with synthetic rubber seals.” |
| Base Number | The amount of acid needed to neutralize all or part of a lubricants basicity. |
| Base Stocks | Refined petroleum oils that can either be blended with one another or supplemented with additives to make lubricants. |
| Bases | Compounds that react with acids to form salts plus water. Alkalis are water-soluble bases used in petroleum refining to remove acidic impurities. Oil soluble bases are included in lubricating oil additives to neutralize acids formed during the combustion of fuel or oxidation of the lubricant. |
| Bearing | An object that supports weight and reduces friction by allowing a surface to rotate or slide when under load. |
| Bearing | Basic machine component designed to reduce friction between moving parts and to support a moving load. |
| Biodegradable | “Ability of a material can be broken down, within given parameters of time and environment, by naturally occurring bacteria into simple substances, which do not harm the environment.” |



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| Term | Explanation |
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| Biodegradation | “The chemical breakdown of materials by living organisms in the environment. The process depends on certain microorganisms, such as bacteria, yeast, and fungi, which break down molecules for sustenance. Certain chemical structures are more susceptible to microbial breakdown than others; vegetable oils, for example, will biodegrade more rapidly than petroleum oils. Most petroleum products typically will completely biodegrade in the environment within two months to two years.” |
| Bleeding | Separation of liquid lubricant from a grease. |
| Block Grease | A very firm grease manufactured in block form to be applied to certain large open plain bearings operating at high temperatures and slow speeds. |
| Blow-by | “Passage of unburned fuel and combustion gases past the piston rings of internal combustion engines, resulting in fuel dilution and contamination of the crankcase oil.” |
| Blow-by | Passage of unburnt fuel and combustion gases past the piston rings of engines. Results in so-called fuel dilution of the crankcase lubricant. |
| Boundary Lubrication | Lubrication between two rubbing surfaces without the development of a full fluid lubricating film. It occurs under high loads and requires the use of antiwear or extreme-pressure additives to prevent metal-to metal contact. |
| BPT | Borderline Pumping Temperature |
| Brinelling | Denting caused by impact of one bearing component against another while stationary. |
| Brookfield Viscosity | “Viscosity, in centipoises, as determined on the Brookfield viscometer (ASTM D2983). The operating principle for the Brookfield viscometer is the torque resistance on a spindle rotating in the fluid being tested. Although Brookfield viscosities are most frequently associated with low temperature properties of gear oils and transmission fluids, they are in fact determined for many other types of lubricant, e.g. white oils. “ |
| BTU | British Thermal Unit |
| By-Pass Filtration | A system of filtration in which only a portion of the total flow of a circulating fluid system passes through a filter at any instant or in which a filter having its own circulating pump operates in parallel to the main flow. |
| Carbon Residue | Coked material remaining after an oil has been subjected to high temperatures. |
| Carcinogen | A cancer-causing substance. Certain petroleum products are classified as potential carcinogens under OSHA criteria. Suppliers are required to identify such products as potential carcinogens on package labels and Material Safety Data Sheets. |
| Cavitation | “The formation of an air or vapour pocket (or bubble) due to lowering of pressure in a liquid, often as a result of a solid body, such as a piston, moving through the liquid; also, the pitting or wearing away of a solid surface as a result of the collapse of a vapour bubble. Cavitation can occur in a hydraulic system as a result of low fluid levels that draw air into the system, producing tiny bubbles that expand explosively at the pump outlet, causing metal erosion and eventual pump destruction. Cavitation can also result when reduced pressure in lubricating grease dispensing systems forms a void, or cavity, which impedes suction and prevents the flow of greases.” |
| CCS | Cold Crank Simulator |
| CEC | Conseil Europeen de Coordination pour les |
| Centipoise (cP) | Unit of measure for apparent viscosity. |
| Centistoke (cSt) | Unit of measure for Kinematic Viscosity. |
| Cetane Index | A value calculated from the physical properties of a diesel fuel to predict its Cetane Number. |



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| Term | Explanation |
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| Cetane Number | “Measure of ignition quality of a diesel fuel. The higher the Cetane Number, the easier a high-speed, direct injection engine will start, and the less white smoking and diesel knock after start up. “ |
| Cetane Number Improver | An additive that boosts the Cetane Number of a fuel while improving combustion efficiency and increasing power in a diesel engine. |
| Chemical Stability | The tendency of a substance or mixture to resist chemical change. |
| Cleveland Open Cup (C.O.C.) | An apparatus used to determine the flash and fire points of petroleum products other than fuel oils and those having an open cup flash below 79°C/175°F. |
| Closed Cup (covered sample container) | “D93 “Flash Point by Pensky-Martens Closed Test”” for fuel oils — also for cutback asphalts and other viscous materials and suspensions of solids “ |
| Cloud Point | The temperature at which a cloud of wax crystals appears when a lubricant or distillate fuel is cooled under standard conditions. Indicates the tendency of the material to plug filters or small orifices under cold weather conditions. |
| CMA | Chemical Manufacturers Association |
| Coefficient of Friction | Number obtained by dividing the frictional force resisting motion between two bodies (F) by the normal force pressing the bodies together (L). $m = F/L$ |
| Cohesion | That property of a substance that causes it to resist being pulled apart by mechanical means. |
| Cold Cranking Simulator (C.C.S.) developed in a cold engine. | An intermediate shear rate viscometer that predicts the ability of an oil to permit a satisfactory cranking speed to be developed in a cold engine. |
| Combustion Chamber | The space between the piston and cylinder head in an internal combustion engine where the charge of fuel plus air is burned to produce power. |
| Compatibility | “A lubricants ability to be mixed with another lubricant without detriment to either lubricant. Also, the ability to come into contact with other components or materials without detrimental effects.” |
| Compound | Substance formed by the combination of two or more elements with differing physical and chemical properties than the combining elements. |
| Compounded Oil | “A blend of petroleum oil with small amounts of fatty or synthetic fatty oils is referred to as compounding. Compounded oils are used for certain wet applications to prevent washing-off of the lubricant from the metal surfaces. The fatty materials enable the oil to combine physically with the water instead of being displaced by it. Cylinder oils for wet steam applications and for some air compressors are compounded. Because the fatty material imparts a strong affinity for metal surfaces, compounded oils are frequently used for applications in which lubricity or extra load-carrying ability are needed. They are not generally recommended, however, for service that requires high oxidation stability. (See Boundary Lubrication)” |
| Compression Ignition | “Ignition of fuel by the heat generated in compressing the air charge, as in the diesel engine.” |
| Compression Ratio | “The ratio of the volume of combustion space at the bottom dead centre to that at top dead centre, in an internal combustion engine.” |
| Consistency | The degree to which a semi-solid material such as grease resists deformation. |
| Contaminant | Any material that is unwanted or adversely affects the fluid power system and/or its components. |
| Coolant | Fluid used to remove heat. Commonly found in an engines cooling system. |
| Copper Strip Corrosion | Qualitative measure of the tendency of a liquid to corrode pure copper. |
| Corrosion | Destruction of a metal by chemical or electro-chemical reaction with its environment. |



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| Term | Explanation |
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| Corrosion Inhibitor | "A lubricant additive for protecting surfaces against chemical attack from contaminants in the lubricant. The most common types of corrosion inhibitors generally react chemically with the metal surfaces to be protected, thus forming an inert film in these areas." |
| cP | CentiPoise |
| Cracking | "Refining process in which large molecules are broken down into smaller molecules. Cracking takes place to some extent whenever high molecular material is heated strongly, but can be increased by catalysts." |
| Crankcase | "The housing in which the crankshaft and many other parts of the engine operate. On a two-cycle engine, the area in which the fuel/oil mixture is drawn before being transferred to the cylinder." |
| Crankcase Dilution | "When unburned fuel finds its way past the piston rings into the crankcase oil, where it dilutes or thins out the engine lubricating oil." |
| Crude Oil | "Naturally occurring petroleum, before any refining or treatment." |
| cSt | CentiStoke |
| Cylinder oil | "A lubricant for independently lubricated cylinders, such as those of steam engines and air compressors; also for lubrication of valves and other elements in the cylinder area. Steam cylinder oils are available in a range of grades with high viscosity's to compensate for the thinning effect of high temperatures; of these, the heavier grades are formulated for superheated and high-pressure steam, and the lighter grades for wet, saturated, or low-pressure steam. Some grades are compounded for service in excessive moisture; see compounded oil. Cylinder oils lubricate on a once-through basis." |
| Demulsibility | Ability of an oil to separate water |
| Density | Mass per unit of volume. |
| Detergent | "Additive to keep engine parts clean. In motor oil formulations, the most commonly used detergents are metallic soaps with a reserve of basicity to neutralize acids formed during combustion." |
| Detonation | Uncontrolled burning of the last portion (end gas) of the air/fuel mixture in the cylinder of a spark-ignition engine. Also known as knock or ping. |
| Differential | Set of gears that transfers the power from the drive shaft to the drive wheels and allows those wheels to turn at different speeds. |
| DIN | German testing standards - Deutsche Industrie Norm |
| Dispersant | "Additive that helps keep solid contaminants in crankcase oil in colloidal suspension, preventing sludge and varnish deposits on engine parts. Usually nonmetallic (ashless), and used in conjunction with detergents." |
| Distillation | Separation of a mixture of liquids with different boiling points by progressively raising the temperature. In a refinery distillation unit the temperature rises continuously from the top to the bottom of the column and different fractions or cuts are drawn off at different heights. |
| DPF | "Diesel Particulate Filter, sometimes called a DPF, is a device designed to remove diesel particulate matter or soot from the exhaust gas of a diesel engine." |
| Drag | Resistance to movement caused by oil viscosity. |
| Dropping Point | The temperature at which a grease changes from semisolid to a liquid state under test conditions. It may be considered an indication of the high temperature limitation for application purposes. |
| Dynamic Viscosity | "Viscosity of a liquid as measured in a rotational instrument, as distinct from the kinematic viscosity where the liquid falls through a capillary tube under its own weight." |



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| Term | Explanation |
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| E.G.R. (Exhaust Gas Recirculation) Valve | “System to reduce automotive emission of nitrogen oxides (Nox). It routes exhaust gases into the intake manifold where they dilute the air/fuel mixture and reduce peak combustion temperatures, thereby reducing the tendency for Nox to form.” |
| Elastohydrodynamic Lubrication (EHD or EHL) | Lubrication characterized by high unit loads and high speeds in rolling elements where the mating parts deform elastically due to the incompressibility of the lubricant film under very high pressure. |
| Elastomer | A rubbery type of material. |
| EMA | Engine Manufacturers Association |
| Emissions | Term used generically to refer to the various components of the engines exhaust. |
| Emulsifier | “Substance used to promote or aid the formation of a stable mixture, or emulsion of oil & water.” |
| Emulsion | “Mixture of two liquids, which are not soluble with each other, such as oil and water. “ |
| Engine Deposits | “Hard or persistent accumulation of sludge, varnish and carbonaceous residues due to blow-by of unburned and partially burned fuel, or the partial breakdown of the crankcase lubricant. Water from the condensation of combustion products, glycol, carbon, residues from fuel or lubricating oil additives, dust and metal particles also contribute.” |
| Entrainment | “Describing a state of an immiscible fluid component. Minute quantities of a fluid (typically water) can be dissolved or absorbed into the oil, but excess quantities can be most harmful to equipment due to the entrainment leaving gaps in the lubricated areas.” |
| EP (Extreme Pressure) Lubricants | Lubricants that impart to rubbing surfaces the ability of carrying greater loads than would be possible with ordinary lubricants without excessive wear or damage. |
| EP additive | “A lubricant additive that prevents sliding metal surfaces from seizing under conditions of extreme pressure (EP). At the high local temperatures associated with metal-to-metal contact, an EP additive combines chemically with the metal to form a surface film that prevents the welding of opposing asperities, and the consequent scoring that is destructive to sliding surfaces under high loads. Reactive compounds of sulfur, chlorine, or phosphorus are used to form these inorganic films.” |
| Erosion | The wearing away of a surface by an impinging fluid or solid |
| Ester | An organic compound formed by the reaction of an acid (organic or inorganic) with an alcohol. |
| Ethanol | “Ethyl alcohol mainly formed through fermentation. (alcoholic drinks, component in gasohol)” |
| Ethylene Glycol | “A colourless, syrupy liquid, used as an antifreeze in cooling and heating systems.” |
| Evaporation Loss | The loss of a portion of a lubricant due to volatilization. |
| Fillers | “A term normally used to denote something non-chemical added to an oil or grease, i.e., moly, graphite, zinc oxide.” |
| Film Strength | “The ability of a lubricant film to withstand the effects of speed, temperature and load without breaking down.” |
| Filter | Any device or porous substance used for cleaning and removing suspended matter from a gas or fluid. |
| Fire Point | Lowest temperature at which a combustible fluid will burst into flame in the presence of an extraneous ignition source. Very little additional heat is required to reach the fire point from the flash point. |
| Fire Resistant Fluid | “A fluid, difficult to ignite, that shows little tendency to propagate flame.” |



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| Term | Explanation |
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| Fire-resistant fluid | “A lubricant used especially in high-temperature or hazardous hydraulic applications, such as steel mills and underground mining. Three common types of fire-resistant fluids are: (1) water-petroleum oil emulsions, in which the water prevents burning of the petroleum constituent; (2) water-glycol fluids; and (3) non-aqueous fluids of low volatility, such as phosphate esters, silicones, and halogenated hydrocarbon-type fluids.” |
| Flash Point | “Minimum temperature of a petroleum product or other combustible fluid at which vapour is produced at a rate sufficient to yield a combustible mixture. Specifically, it is the lowest sample temperature at which the air vapour mixture will “flash” in the presence of a small flame. Flash point may be determined by the following ASTM Methods: “ |
| Fluid | “Liquid, gas or combination thereof.” |
| Fluid Friction | “Occurs between the molecules of a gas or liquid in motion, and is expressed as shear stress. Unlike solid friction, fluid friction varies with speed and area.” |
| Fluid Power | Energy transmitted and controlled through use of a pressurized fluid within an enclosed circuit. |
| Foam | “An agglomeration of gas bubbles separated from each other by a thin liquid film. If an oil is said to not foam, the small air bubbles will quickly combine, become larger bubbles, and then break to vent to the atmosphere. If this action occurs slowly, the oil is said to foam.” |
| Foam Inhibitor | An additive which causes foam to dissipate more rapidly. It promotes the combination of small bubbles into large bubbles which burst more easily. |
| Foaming | A possible reaction of an oil when mixed with air. This entrained air can result in reduced film strength and a performance reduction. |
| Four Ball Test | “ Machine used to evaluate a lubricants antiwear qualities, frictional characteristics, or load carrying capabilities. There are four steel -inch balls. Three of the balls are clamped together in a cup filled with lubricant while the fourth ball is rotated against them. Two test procedures are based on this same principle the Four Ball EP Test (ASTM D-2596) and Four Ball Wear Test (ASTM D-2266). “ |
| Four Stroke Engine | An internal combustion engine that requires two revolutions of the crankshaft to complete all four cycles. |
| Fretting | “A form of attritive wear resulting from small-amplitude oscillations or vibrations that cause the removal of very finely divided particles from rubbing surfaces (e.g., the vibrations imposed on the wheel bearing of an automobile when transported by rail car). With ferrous metals the wear particles oxidize to a reddish, abrasive iron oxide, which has the appearance of rust or corrosion, and is therefore sometimes called fretting corrosion; other terms applied to this phenomenon are false brinelling (localized fretting involving the rolling elements of a bearing) and friction oxidation. Generally, lubricants will not prevent fretting, but they can alleviate the problem to varying degrees. ASTM D 4170 is used to determine the fretting wear protection quality of greases, but it cannot distinguish between fretting wear and false brinelling.” |
| Friction | “The resistance to the motion of one surface over another. The amount of friction is dependent on the smoothness of the contacting surfaces, as well as the force with which they are pressed together. Friction between unlubricated solid bodies is independent of speed and area. The coefficient of friction is obtained by dividing the force required to move one body over a horizontal surface at constant speed by the weight of the body. Coefficients of rolling friction (e.g., the motion of a tire or ball bearing) are much less than coefficients of sliding friction. Sliding friction is thus more wasteful of energy and can cause more wear. Fluid friction occurs between the molecules of a gas or liquid in motion, and is expressed as shear stress. Unlike solid friction, fluid friction varies with speed and area. In general, lubrication is the substitution of low fluid friction in place of high solid-to-solid friction.” |



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| Fuel Dilution | "The amount of unburned fuel present in the lubricant. This test will indicate problems such as fuel line, injector, carburettor and pump leaks. Fuel dilution is accurate down to less than 0.5%." |
| Full Film Lubrication | Complete separation of mated surfaces. No metal-to-metal contact. |
| Full-Flow Filtration | A system of filtration in which the total flow of a circulating fluid system passes through a filter prior to component delivery. |
| Gears | Toothed machine parts for transmitting power from one shaft to another. |
| Gravity | The mass/volume relationship of lubricants used in determining volume requirements for specific mass of products (packaging). |
| Grease | "Lubricant composed of an oil or oils thickened with a soap, soaps or other thickener to a semi-solid consistency." |
| Gum | "A rubber like, sticky deposit black or dark brown in colour resulting from the oxidation of lubricating oils from unstable constituents in gasoline, which deposit during storage or use." |
| High Temperature High Shear Rate Viscosity (HTHS) | "A measure of a fluids resistance to flow under conditions resembling highly-loaded journal bearings in fired internal combustion engines, typically 1 million s-1 at 150°C." |
| Horsepower | "A measurement of an engines power, equal to 550 foot pounds of torque per second." |
| Hydrocarbons | Compounds of hydrogen & carbon of which petroleum products are typical examples. Also known as organic compounds. |
| Hydrocracking | "A process used by a few manufacturers of superior quality lubricant basestock. In this process, a petroleum feedstock is reacted with hydrogen, in the presence of a catalyst, at very high temperatures (400-425°C) and pressures (3000 + psi). Under these severe conditions, virtually all the aromatic hydrocarbons present are isomerized and saturated to yield a basestock containing 96% to 99.5+% saturated hydrocarbons. The process also virtually eliminates all traces of sulphur, nitrogen and oxygen-containing impurities. Hydrocracking produces very high quality, synthetic-like basestocks which, when blended with carefully selected additives, give extremely stable lubricants of a synthetic level performance. " |
| Hydrodynamic Lubrication | "A lubrication regime characterized by a full fluid film between two moving surfaces. The most common example is the type of lubrication that occurs in oil lubricated journal bearings. The movement of one surface (the shaft or journal) ""pulls"" lubricating oil into the space between the journal and the bearing. This action develops a high pressure in the fluid that completely separates the two surfaces. By contrast, in boundary lubrication there is only a partial fluid film separating the two surfaces and some surface-to-surface contact occurs. " |
| Hydrofinishing | A process for treating raw extracted base stocks with hydrogen to saturate them for improved stability. |
| Hydrosomerization | "The Hydrosomerization process employs a special catalyst which selectively isomerizes wax molecules to isoparaffinic lube oils. The process produces basestocks with higher VIs (Viscosity Index) and improved low temperature fluidity, compared to stocks produced with low conventional de-waxing. This process can also be utilized to produce selected base oils with VIs approaching 130 and performance characteristics very similar to synthetic lubricants such as polyalphaolefins (PAO). " |
| Hydrolytic Stability | Ability of additives and certain synthetic lubricants to resist chemical decomposition (hydrolysis) in the presence of water. |
| Hydrotreating | "A generic name for a refinery process for treating fuels and lubricant feedstocks at elevated temperatures, in the presence of pressurized hydrogen and a catalyst. This relatively mild process is sometimes called ""Hydrofinishing"" and is used to |



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| Term | Explanation |
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| | improve the colour and odour of fuels and lubricant basestocks. “ |
| Hypoid Gear Lubricant | A gear lubricant having extreme pressure characteristics for use in hypoid type gears (as in the differential of an automobile). |
| ILSAC | International Lubricant Standardization and Approval Committee |
| Incompatibility | “When a mixture of two or more substances shows physical properties or service performance characteristics, which are inherently inferior to those of either of the individual products before mixing.” |
| Inhibitor | “Additive that improves the performance of a petroleum product by controlling undesirable chemical reactions, i.e., oxidation inhibitor, rust inhibitor, etc.” |
| Insolubles | “Contaminates found in used oils due to dust, dirt, wear particles or oxidation products. “ |
| ISO (International Organization for Standardization) | example is the ISO Viscosity Grade system for industrial oils. |
| JAMA | Japanese Automobile Manufacturers Association Inc. |
| JASO | Japan Automobile Standards Organization |
| Journal | Part of shaft or axle that rotates or angularly oscillates in or against a bearing or about which a bearing rotates or angularly oscillates. |
| Kinematic Viscosity | Measure of a fluids resistance to flow under gravity at a specific temperature (usually 40°C or 100°C). |
| Lubrication | “Control of friction and wear by the introduction of a friction reducing film between moving surfaces in contact. May be a fluid, solid or plastic substance. “ |
| Material Safety Data Sheet (MSDS) | Vital information regarding the safe handling and storage of a product. |
| Micron | “A millionth of a meter, or 0.0000394 inch.” |
| Mineral Oil | Term applied to a wide range of products that is typically used when referring to petroleum-based lubricants. |
| Multi-viscosity/Multi Grade Oil | “Engine or gear oil that meets the requirements of more than one SAE viscosity grade classification, and that can be used over a wider temperature range than a single grade oil.” |
| Naphthenic | “A type of petroleum fluid derived from naphthenic crude oil, containing a high proportion of closed-ring methylene groups.” |
| Neutralization Number | A measure of the acidity or alkalinity of an oil. |
| Newtonian Flow | “Occurs in a liquid system where the rate of shear is directly proportional to the shearing force, as with straight grade oils which do not contain polymeric viscosity modifier. When rate of shear is not directly proportional to the shearing force, flow is non-Newtonian, as it is with oils containing viscosity modifiers. See also Non-Newtonian fluid.” |
| Nitration | “Process where nitrogen oxides attack petroleum fluids at high temperatures, often resulting in viscosity increase and deposit formation. Nitration only occurs in applications where fuel is used.” |
| NLGI | “National Lubricating Grease Institute, an industry group that monitors grease and sets penetration standards for grading greases.” |
| NMMA | National Marine Manufacturers Association |
| Non-Newtonian fluid | “Fluid, such as a grease or a polymer-containing oil (e.g., multi-grade oil), in which shear stress is not proportional to shear rate. “ |
| Octane Number | A measure of a fuels ability to prevent detonation in a spark-ignition engine. |
| Organic Acid | “An organic compound, with acid properties, obtained from organic substances such as animal, vegetable and mineral oils, i.e., a fatty acid.” |



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| Oxidation | “A form of chemical deterioration to which petroleum products — like most other organic materials — are subject. The resistance of many petroleum products to oxidation, however, is very high. Oxidation usually involves the addition of oxygen atoms, and the result is nearly always one of degradation. It is accelerated by higher temperatures, the reaction becoming significant at temperatures above 70°C. For every 10°C rise, the rate of oxidation essentially doubles. Oxidation is also promoted by the presence of catalytic metals, copper being particularly active in this latter respect. What is more, the peroxides that are the initial products of oxidation are themselves oxidizing agents. So the oxidation of petroleum products is a chain reaction; the farther it progresses, the more rapid it becomes. With fuels and lube oils, oxidation produces sludges, varnishes, gums, and acids, all of which are undesirable. Nevertheless, many oils, such as turbine oils, give years of service without need for replacement. Petroleum products that require a long service or storage life can be formulated to meet requirements by: “ |
| Oxidation Inhibitor | “Chemical added in small quantities to a petroleum product to increase its oxidation resistance and thus to lengthen its service or storage life. An oxidation inhibitor may combine with the peroxides formed initially by oxidation, thereby modifying them in such a way as to arrest their oxidizing influence. Or the inhibitor (a passivator) may react with a catalyst either to “poison” it or to coat it with an inert film. “ |
| Oxidation Stability | “Resistance of an oil product to oxidation and, therefore, a measure of its potential service or storage life.” |
| Oxygenated Fuels | “Fuels for internal combustion engines that contain oxygen combined in the molecule, e.g., alcohols, ethers and esters. Term also applies to blends of gasoline with oxygenates, e.g., Gasohol, which contains 10% by volume of anhydrous ethanol in unleaded gasoline.” |
| PAO | Polyalphaolefin |
| Paraffin | Hydrocarbons belonging to the series starting with methane (CH ₄). Paraffins are saturated with respect to hydrogen. High molecular weight paraffins are solid such as paraffin wax. |
| Particle | “A minute piece of matter with observable length, width and thickness, usually measured in micrometers.” |
| PCV (Positive Crankcase Ventilation) Valve | An emissions control device that allows gases from the crankcase to be reintroduced into the intake. |
| Penetration | A test in which a cone is dropped into a grease sample to measure the penetration or how hard or soft the grease is at room temperatures. The cone penetrates farther in a soft grease and therefore has a higher penetration number. This penetration relates to an NLGI number. A number 0 grease is called an NLGI 0 grade and will be softer than an NLGI 1 or 2 grade. |
| pH | “A measure of acidity or alkalinity. Values of pH run from 0-14; 7 indicating neutrality, numbers less than 7 indicate increasing acidity, and numbers greater than 7 indicate increasing alkalinity.” |
| Pitting | “Surface cavities, may be related to fatigue, overload or corrosion.” |
| Pneumatics | Engineering science pertaining to gaseous pressure and flow. |
| Poise | “Unit of viscosity, defined by the shear stress required to move one layer of fluid along another over a total thickness of one centimetre at a velocity of one centimetre per second. This viscosity is independent of fluid density, and directly related to flow resistance.” |
| Polishing (bore) | “Excessive smoothing of the surface finish of the cylinder bore or cylinder liner in an engine to a mirror-like appearance, resulting in depreciation of ring sealing and oil consumption performance.” |
| Polymerization | Chemical combination of similar type molecules to form larger molecules. |



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| Term | Explanation |
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| Pour Point | “Is a widely used low-temperature flow indicator and is 3°C above the temperature at which a normally liquid petroleum product maintains fluidity. It is a significant factor in cold-weather start-up, but must be considered along with pumpability, the ease with which an oil pumps at low temperatures. Paraffinic oils contain wax that forms a honeycomb of crystals at low temperatures near the pour point. However, agitation by a pump breaks down this wax structure and allows paraffinic oil to be pumped at temperatures well below their pour point. Naphthenic oils, on the other hand, contain little or no wax and reach their pour point through increase in viscosity; they cannot be pumped readily near the pour point. ASTM D97 is used to determine pour point. ASTM D97 also provides for the determination of Cloud Point, the lowest temperature at which the sample becomes clouded by the formation of wax crystals. Clouding is a characteristic only of paraffinic oils. It is a consideration in the evaluation of fuels whose filtration might be impaired by the plugging effect of wax crystals. “ |
| Pour Point Depressant | Additive used to lower the pour point or lower the temperature fluidity of a petroleum product. |
| Preignition | “Ignition of the fuel/air mixture in a gasoline engine before the spark plug fires. Often caused by incandescent fuel or lubricant deposits in the combustion chamber, it wastes power and may damage the engine.” |
| Propylene Glycol | A non-toxic liquid used as a coolant/antifreeze in cooling and heating systems. |
| Pumpability | “The low temperature, low shear stress-shear rate viscosity characteristics of an oil that permit satisfactory flow to and from the engine oil pump and subsequent lubrication of moving components.” |
| Refining | “Series of processes to convert crude oil and its fractions into finished petroleum products, which may include thermal cracking, catalytic cracking, polymerization, alkylation, reforming, hydrocracking, hydrofoaming, hydrogenation, hydrogen treating, Hydrofining, solvent extraction, de-waxing, de-oiling, acid treating, clay filtration, de-asphalting, etc.” |
| Re-refining | “A process of reclaiming used lubricant oils and restoring them to a condition similar to that of virgin stocks by filtration, clay adsorption or more elaborate methods.” |
| Ring Sticking | Freezing of a piston ring in its groove in a piston engine or reciprocating compressor due to heavy deposits in the piston ring zone. |
| Rust | Slow oxidation of iron. |
| Rust Inhibitor | A lubricant additive for protecting ferrous (iron and steel) components from rusting caused by water contamination or other harmful materials from oil degradation. Some rust inhibitors operate similarly to corrosion inhibitors by reacting chemically to form an inert film on metal surfaces. Other rust inhibitors absorb water by incorporating it into water-in-oil emulsion so that only the oil touches the metal surfaces. |
| Rust Preventative | Compound for coating iron surfaces with a film that protects against rust. Commonly used to preserve equipment in storage. |
| SAE | Society of Automotive Engineers |
| SAE Grade | Numbers applied to automotive lubricants to indicate their viscosity range. |
| SAPS | “Sulphated Ash, Phosphorous And Sulphur. Low levels required for catalytic converters used to reduce diesel particulates from engines to meet European standards.” |
| “Saybolt, Saybolt Universal Seconds, SUS, or SSU” | “The most common viscosity measurement prior to the international acceptance of centistokes, SUS measurements are now obsolete. To convert measurements from SUS at 100°F to an approximate value in cSt at 40°C (ISO viscosity grade), divide the SUS value by 5.” |



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| Term | Explanation |
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| Scoring | Scratches on mechanical parts in the direction of motion caused by abrasive contaminants. |
| SCR | “Selective catalytic reduction is a means of converting nitrogen oxides, also referred to as NO _x with the aid of a catalyst into diatomic nitrogen, N ₂ , and water, H ₂ O.” |
| Scuffing | “Abnormal engine wear due to localized welding and fracture. It can be prevented through the use of antiwear, extreme-pressure and friction modifier additives. See adhesion.” |
| Semi Fluid | Any substance having attributes of both a liquid and a solid. Similar to semi solid but being more closely related to a liquid than a solid. |
| Shear Stability | Ability of a lubricant to withstand shearing forces without being degraded to lower viscosity or consistency. |
| Shear Stress | “A unit of frictional force overcome in sliding one layer of fluid along another. This is typically measured in pounds per square foot, with pounds representing the frictional force, and square feet representing the area of contact between the sliding layers.” |
| Sludge | “A thick, dark residue, normally of mayonnaise consistency, that accumulates on nonmoving engine interior surfaces. Generally removable by wiping unless baked into a carbonaceous consistency, its formation is associated with insolubles overloading the lubricant.” |
| Solid | “Any substance having definite shape that it does not readily relinquish. More generally, any substance in which the force required to produce a deformation depends upon the magnitude of the deformation rather than the rate of deformation.” |
| Solvency | The ability to dissolve into a solution producing a homogeneous physical mixture. The degree of solvency varies along with the rate of dissolution depending on the amount of heat added to the solution. |
| Solvent Extraction | “A traditional refinery process that is used to upgrade chemical and physical properties in the manufacture of lube oil basestocks. The process relies on the solubility of impurities (especially aromatic components that may also contain sulphur and nitrogen) in an extractive solvent, usually furfural or phenol. The by-product of this process is highly aromatic Extract, used to make Extender oils, and as feed for other refinery processes. “ |
| Stick-slip motion | “Erratic, noisy motion characteristic of some machine ways, due to the starting friction encountered by a machine part at each end of its back-and-forth (reciprocating) movement. This undesirable effect can be overcome with a way lubricant, which reduces starting friction.” |
| STLE (Society of Tribologists and Lubrication Engineers) | Formerly known as ASLE. |
| Stoichiometric | “Ratio of fuel to air where the exact proportions for complete reaction of both, with none left over, are present. “ |
| Stoke (St) | Kinematic measurement of a fluids resistance to flow defined by the ratio of the fluids dynamic viscosity to density. |
| Sulphated Ash | See Ash Content |
| Supercharger | “A device for increasing the pressure and hence the mass of air and fuel burned on each firing stroke. Driven by the crankshaft; therefore, displacement is fixed and directly related to engine RPMs.” |
| Surface Tension | The contractile surface force of a liquid by which it tends to assume a spherical form and to present the least possible surface. It is expressed in dyne/cm or ergs/cm. |



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| Term | Explanation |
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| SUS or SSU | Saybolt Universal Seconds |
| SUTO | Super Universal Tractor Oil |
| Synthetic Lubricant | "Fluid made by chemically reacting materials to produce a lube with a specific chemical composition, which has planned, and predictable properties." |
| Thermally Stable | Ability to withstand temperatures without decomposing. Not to be confused with oxidation stability where oxygen must be present and oxidation rather than decomposition. |
| Thickener | The metallic soap or other material used to combine with oil or other lubricating fluid to make a grease. |
| Timken OK Load | "Measure of the extreme pressure properties of a lubricant. Lubricated by the product under investigation, a standard steel roller rotates against a block. Timken OK load is the heaviest load that can be carried without scoring." |
| Torque | "The twisting force with which the engines crankshaft actually rotates, measured in foot-pounds." |
| Total Acid Number (TAN) | "The quantity of base, expressed in milligrams, that is required to neutralize all acidic constituents present in one gram of sample." |
| Total Base Number (TBN) | "The quantity of acid, expressed in terms of the number of milligrams that is required to neutralize all basic constituents present in one-gram sample." |
| Total Solids | "The total amount of solids contamination, both suspended and non-suspended present in the lubricant. This test is indicative of carburetion problems (too rich or too lean), if the oil filter has reached the saturation point and is no longer able to remove contamination from the system, and if the air intake system is functioning properly and allowing enough air into the unit for complete burn to take place." |
| Tribology | "Science of the interactions between surfaces moving relative to each other, including the study of lubrication, friction and wear." |
| Turbine | "A device consisting of blades attached to a disc or rotor, which converts flow into rotary action." |
| Turbocharger | "A device for increasing the pressure and hence the mass of air and fuel burned on each firing stroke. A turbine of exhaust gases drives a compressor; therefore, efficiency is variable and related to exhaust pressure." |
| UTTO | Universal Tractor transmission Oil |
| Vapour Lock | Condition wherein the fuel boils in the fuel system forming bubbles that retard or stop the flow of fuel to the engine. |
| Vapour Pressure | "The measure of a liquids volatility. The higher the pressure at a standard test temperature, the more volatile the sample, and the more readily it will evaporate." |
| Varnish | A deposit resulting from oxidation and polymerization of fuels and lubricants. Similar to but softer than lacquer. |
| VI | Viscosity Index |
| VII | Viscosity Index Improve |



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| Term | Explanation |
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| Viscosity | “Measure of a fluid’s resistance to flow. It is ordinarily expressed in terms of the time required for a standard quantity of the fluid at a certain temperature to flow through a standard orifice. The higher the value, the more viscous the fluid. Since viscosity varies inversely with temperature, its value is meaningless unless accompanied by the temperature at which it is determined. With petroleum oils, viscosity is now commonly reported in Centistokes (cSt), measured at either 40°C or 100°C (ASTM Method D445 — Kinematic Viscosity). An earlier method for reporting viscosity in North America was in Saybolt Seconds Universal — SSU or SUS — or, for very viscous oils, in Saybolt Seconds Furol — SSF (ASTM Method D88). Other less common viscosity units are the Engler and Redwood scales, principally used in Europe. (See also Brookfield Viscosity, Poise) “ |
| Viscosity Index | “The measure of the rate of change of viscosity with temperature. Heating tends to make lubricants thinner, cooling makes them thicker. The higher the viscosity index is on a particular fluid, the less of a change in viscosity there will be over a given temperature range. In determining the viscosity index, two temperatures of viscosity are taken, one at 40°C and the other at 100°C. An indicator of the rate of change of viscosity with temperature. This change is common to all non-reactive fluids — some more, some less. Heating tends to make them thinner — cooling, thicker. The higher the V.I., the less the tendency for the viscosity to change. V.I. is determined by formula from the viscosities at 40°C and 100°C in accordance with the ASTM Test Method D567 or D2270. The latter test is required for V.I.s above 100. High V.I. oils are often preferred for service in which a relatively constant viscosity is desired under conditions of varying temperature. Some hydraulic systems require this property. Paraffinic oils are inherently high in V.I., and the V.I. of any petroleum oil can be increased by the addition of a V.I. improver. Naphthenic oils are inherently low in V.I. and aromatic oils are still lower — often having negative numbers. “ |
| Viscosity Index Improver (V.I.I.) | “Additive to improve or increase the viscosity index. A VI improver increases an oils resistance to thinning as it is heated. It is commonly used in multi-viscosity or multigrade oils. Since a VI improver increases the viscosity as well as the viscosity index, it must be taken into consideration when formulating oil. (Example: taking an oil in the SAE 30 range, adding a VI improver could give an oil like a SAE 40)” |
| Viscosity Modifier | “See V.I.I. Additive, usually a high molecular weight polymer that reduces the tendency of an oils viscosity to change with temperature.” |
| Volatility | “That property of a liquid that defines its evaporation characteristics. Of two liquids, the more volatile will boil at a lower temperature, and it will evaporate faster when both liquids are at the same temperature. The volatility of petroleum products can be evaluated by tests for Flash Point, Vapour Pressure, Distillation, and Evaporation Rate. “ |
| Wear | Damage resulting from the removal of materials from surfaces in relative motion. |
| ZDDP | Zinc Dithiophosphate |
| Zinc (ZDDP) | “Commonly used name for zinc dithiophosphate, an antiwear/oxidation inhibitor chemical. “ |