KEY TERMINOLOGY

Additive

- Chemical Substance added to a petroleum product to impart or improve certain properties.

Aromatic

- Unsaturated hydrocarbon identifies by one or more benzene rings or by chemical behavior similar to benzene. Aromatics are usually mare reactive and have higher solvency than paraffin and naphthenes.

Ash Content

- Non-combustible residue in fuel determined in accordance with ASTM test methods.

ASTM

- American Society for Testing and Materials.

Biocide

- EPA registered product to kill existing bacteria and inhibit new growth

Blending

- Refers to adding kerosene to diesel fuel to lower the low temperature operability of a diesel vehicle. Kerosene lowers the wax appearance point (clos point) by about 2°F for each 10% increment of kerosene added.

BTU (British Thermal Unit)

- Quantity of heat needed to raise the temperature of one pound of water one degree Fahrenheit.

Cetane Improver

- Additive for raising the Cetane number of diesel fuel.

Cetane Number

- Cetane number or CN is an indicator of the combustion speed of diesel fuel. It is an inverse of the similar octane rating for gasoline. The CN is an important factor in determining the quality of diesel fuel, but not the only one; other measurements of diesel's quality include (but are not limited to) energy content, density, lubricity, cold-flow properties and sulfur content.

CFPP

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- Cold filter plugging point (CFPP) is the lowest temperature, expressed in degrees Celsius (°C), at which a given volume of diesel fuel still passes through a standardized filtration device in a specified time when cooled under certain conditions. This test gives an estimate for the lowest temperature that a fuel will give trouble free flow in certain fuel systems.

Cloud Point

- Cloud point refers to the temperature (low temperatures) below which wax in diesel or biowax in biodiesels form a cloudy appearance. The presence of solidified waxes thickens the oil and clogs fuel filters and injectors in engines. The wax also accumulates on cold surfaces (e.g. pipeline or heat exchanger fouling) and forms an emulsion with water.
- The lower the cloud point indicated by the fuel additive, the better.
- **NOTE**: Cloudiness, when fuel is treated, is not necessarily a bad thing. Xp3 additive will keep the wax crystals and water suspended avoiding masses of wax crystals from forming.

Cold Filter Plug Point (CFPP)

- Cold filter plugging point is the lowest temperature, expressed in degrees Celsius (°C), at which a given volume of diesel type of fuel still passes through a standardized filtration device in a specified time when cooled under certain conditions. This test gives an estimate for the lowest temperature that a fuel will give trouble free flow in certain fuel systems.

Cold Flow Improver

- This type of additive improves the flow of fuel during cold weather by either depressing the fuel's cloud point or pour point without negatively affecting engine performance.
- Not all cold flow improvers are made the same though. Be sure to check what added degrees of flow improver the additive provides and with what ratio of additive to fuel.

Combustion

- Rapid oxidation of a fuel (burning).

Corrosion

- Chemical attack on metal. Common corrosive contaminants are: water, which causes rust; and acids, which may form as oxidation products.

Corrosion Inhibitor

- Additive for protecting metal surfaces again chemical attack.

DEF/DEF Filter

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- Diesel Exhaust Fluid (DEF) is an aqueous urea solution made with 32.5% urea and 67.5% deionized water. DEF is used as a consumable in selective catalytic reduction (SCR) in order to lower NOx concentration in the diesel exhaust emissions from diesel engines

DEF Filter

- The Diesel Exhaust Fluid (DEF) Filter offers a convenient, effective way to deliver clean DEF into your equipment. If DEF is not filtered, urea crystals and other contaminants picked up during storage and handling can cause malfunction of the SCR system. The DEF Filter removes harmful particulate, preventing plugged dosing valves and enabling the SCR to do the important job of reducing harmful NOx emissions.

Detergent

- Helps control varnish, injector deposits, ring deposits and rust by keeping insoluble particles in colloidal suspension and in some cases, by neutralizing acids.

Diesel Fuel

- That portion of crude oil that distills out as a liquid within the temperature range of approximately 392°F to 698°F. Diesel fuel is ignited in an internal combustion engine cylinder by the heart of air under high compression. There are two grades of diesel fuel established by the ASTM: diesel #1 and diesel #2.

Dispersant

- Additive that helps prevent sludge, varnish, and other engine deposits by keeping particles suspended in a colloidal state. A dispersant can keep appreciably larger quantities of contaminants in suspension that can be a detergent.

Emissions

- Emissions are pollutants generated by variety of sources, i.e. machines, burning, vehicles, etc. Under the Clean Air Act, EPA establishes air quality standards to protect public health and the environment. EPA has set national air quality standards for six common air pollutants. These include:
    - CO - carbon monoxide
    - NOx - nitrogen dioxide
    - SO2 - sulfur dioxide
    - PM - particulate matter (also known as particle pollution)
    - Pb - lead
- The majority of the first 4 are produced by mobile units burning fuel. Each state or territory in the US has established different minimums allowed.

Engine Deposits

- Hard or persistent accumulations of sludge, varnish, and carbonaceous residues. Engine deposits can impair engine performance and damage engine components.

EPA

- Environment Protection Agency.

Filter

- A fuel filter is a filter in the fuel line that screens out dirt and rust particles from the fuel, normally made into cartridges containing a filter paper. They are found in most internal combustion engines.

Flash Point

- The flash point of a volatile material is the lowest temperature at which vapors of a fluid will ignite. Measuring a flash point requires an ignition source. At the flash point, the vapor may cease to burn when the ignition source is removed.
- Flash point is an important indicator of fire and explosion hazards associated with a petroleum product.

Friction

- Resistance to the motion of one surface over another. Fluid friction occurs between the molecules of a gas or a liquid in motion.

Fuel Efficiency

- Thermal fuel efficiency: is the process that converts chemical potential energy contained in the fuel into kinetic energy or work. Fuel efficiency may vary per device and application, especially on fossil fuel power plants or industries dealing with combustion. In the context of transportation, fuel economy is the energy efficiency of a particular vehicle
- Fuel consumption: is a more accurate measure of a vehicle's performance because it is a linear relationship while fuel economy leads to distortions in efficiency improvements.
- Fuel efficiency: depends on many parameters of a vehicle, including its engine parameters, aerodynamic drag, weight, rolling resistance and driving patterns.
- Energy efficiency: is similar to fuel efficiency but the input is usually in units of energy such as British thermal units (BTU), mega joules (MJ), gigajoules (GJ), kilocalories (kcal), or kilowatt-hours (kW·h).
- Energy intensity: is the inverse of energy efficiency, it is the amount of input energy required for a unit of output such as MJ/passenger-km (of passenger transport), BTU/ton-mile or kJ/t-km (of freight transport), GJ/t (for production of steel and other materials), BTU/(kW·h) (for electricity generation), or liters/100 km (of vehicle travel). Liters per 100 km is also a measure of "energy intensity" where the input is measured by the amount of fuel and the output is measured by the distance travelled. For example: Fuel economy in automobiles.
- Energy content of fuel (heat of combustion): is the heat energy obtained when a certain quantity of fuel is burned. Two different values of specific heat energy for the same batch of fuel exist; One is the high (or gross) heat of combustion and the other is the low

(or net) heat of combustion. The difference between the high and low values is significant, about 8% or 9%. This accounts for most of the apparent discrepancy in the heat value of gasoline. In the U.S. (and the table) the high heat values have traditionally been used, but in many other countries, the low heat values are commonly used.

Fuel Injection

- Method of introducing fuel under pressure through a small nozzle into the intake system of a cylinder of an engine. Fuel injection is essential to the diesel cycle.

Fuel Pumps

- A fuel pump is a frequently (but not always) essential component on a car or other internal combustion engine device. Many engines (older motorcycle engines in particular) do not require any fuel pump at all, requiring only gravity to feed fuel from the fuel tank through a line or hose to the engine. But in non-gravity feed designs, fuel has to be pumped from the fuel tank to the engine and delivered under low pressure to the carburetor or under high pressure to the fuel injection system. Often, carbureted engines use low pressure mechanical pumps that are mounted outside the fuel tank, whereas fuel injected engines often use electric fuel pumps that are mounted inside the fuel tank (and some fuel injected engines have two fuel pumps: one low pressure/high volume supply pump in the tank and one high pressure/low volume pump on or near the engine)
- Fuel is the adrenaline of your car, truck or engine. Aside from clean fuel, your car should have superior quality fuel pumping to deliver and maximize your car's performance. Various types of fuel pumps like automotive fuel pumps and electric fuel pumps are currently out in the market to fit your specific vehicle.
- Some vehicles' stock fuel pumps are not equipped to deliver the amount of fuel required by the particular car. Reduced performance can be noticed after a period of time. Hence, it is important to install a new fuel pump that ensures immediate increase in power when used with performance components. Upgrading your fuel pump is especially important if you have added a high-performance carburetor or larger fuel injectors to your engine to maximize your use of such.

Gelling

- Gel point is the temperature point at which the diesel finally turns solid and can no longer flow through the fuel lines

Hydrocarbon

- Chemical compound of a hydrogen and carbon. Hydrogen and carbon atoms can be combined in virtually countless ways to make a diversity of products.

Hydrocarbon (HC) Emissions

- Substances considered to be atmospheric pollutants because the more reactive hydrocarbons (aromatics) undergo a photochemical reaction with nitrogen oxides (NOx) to form oxidants, components of smog, that can cause eye irritation and respiratory problems.

Injector

- Fuel injection is a system for introducing fuel into internal combustion engines, and into automotive engines, in particular. On diesel engines, fuel injection is a necessity, whilst on petrol engines fuel injection is an alternative to the carburetor.

Inhibitor

- Additives that improves the performance of a petroleum product through the control of undesirable chemical reactions.

Internal Combustion Engine

- Heat engine driven directly by the expansion of combustion gases.

Jet Fuel or Aviation Turbine Fuel (ATF)

- Jet fuel, aviation turbine fuel (ATF), is a type of aviation fuel designed for use in aircraft powered by gas-turbine engines. It is colorless to straw-colored in appearance. The most commonly used fuels for commercial aviation are Jet A and Jet A-1, which are produced to a standardized international specification

Kerosene

- Kerosene is a combustible hydrocarbon liquid widely used as a fuel in industry and households. It is one of the lightest fuels, and is similar to that of Diesel Fuel. Kerosene is widely used to power jet engines of aircraft, and is also commonly used as a cooking and lighting fuel. Because it has a very low pour point, it is commonly used in the winter months.
- The problem with Kerosene is the lack of lubricity and lower power.

Lubricity

- Lubricity is a measure of the fuel's ability to lubricate and protect the various parts of the engine's fuel injection system from wear. Lubricity is the measure of the reduction in friction and or wear by a lubricant. The lubricity of a substance is not a material property, and cannot be measured directly. Tests are performed to quantify a lubricant's performance for a specific system.

MSDS/SDS

- US department of Labor, Occupational Safety and Health Administration, Material Safety Data Sheet or Safety Data Sheet.

Multifunctional Additive

- Multifunctional additives are those additives that have the ability to provide improvement to various properties of the fuel, rather than one specific one.

Naphtha

- Naphtha is a general term that has been used to refer to liquid hydrocarbon mixtures, like crude oil, fuel, petroleum, etc.

Nitrogen Oxides (NOx)

- Emissions, from man-made and natural sources, of nitric oxides (NO) with minor amounts of nitrogen dioxide (NO_2). NOx are formed whenever fuel is burned at high temperature in aid, from nitrogen in the air as well as in the fuel. Motor vehicles and stationary combustion sources are the primary man-made sources. Natural emissions of NOx arise from bacterial action in the soil. NOx can react with hydrocarbons to produce smog.

Oil Analysis

- Oil analysis involves sampling and analyzing oil for various properties and materials to monitor wear and contamination in an engine, transmission or hydraulic system. Sampling and analyzing on a regular basis establishes a baseline of normal wear and can help indicate when abnormal wear or contamination is occurring.
- Oil analysis works like this. Oil that has been inside any moving mechanical apparatus for a period of time reflects the exact condition of that assembly. Oil is in contact with engine or mechanical components as wear metallic trace particles enter the oil. These particles are so small they remain in suspension. Many products of the combustion process also will become trapped in the circulating oil. The oil becomes a working history of the machine.
- Particles caused by normal wear and operation will mix with the oil. Any externally caused contamination also enters the oil. By identifying and measuring these impurities, you get an indication of the rate of wear and of any excessive contamination. An oil analysis also will suggest methods to reduce accelerated wear and contamination.
- The typical oil analysis tests for the presence of a number of different materials to determine sources of wear, find dirt and other contamination, and even check for the use of appropriate lubricants.
- Oil analysis can detect:
    - Fuel dilution of lubrication oil
    - Dirt contamination in the oil
    - Antifreeze in the oil
    - Excessive bearing wear
    - Misapplication of lubricants

Octane

- Octane rating or octane number is a standard measure of the performance of an engine or aviation fuel. The higher the octane number, the more compression the fuel can withstand before detonating (igniting). In broad terms, fuels with a higher octane rating are used in high performance gasoline engines that require higher compression ratios.

Olefin

- Any of a series of unsaturated, relatively unstable hydrocarbons characterized by the presence of a double bond between two carbon atoms in its structure, which is chemically active and provides a focal point for the addition of other reactive elements such as oxygen. Due to their ease of oxidation, olefins are undesirable in petroleum solvents and lube oils. Examples of olefins are ethylene and propylene.

Oxidation

- The chemical combination of a substance with oxygen. All petroleum products are subject to oxidation, with resultant degradation of their composition and performance. The process is accelerated by heat, light, metal catalysts (copper) and the presence of water, acids or solid contaminants.

Particulates

- Vehicle particulate composition consisting of carbon, unburnt lube oil, unburnt fuel, sulfate and other residues. In sufficient concentration, particulates can be a respiratory irritant.

Pour Point

- The pour point of a liquid is the temperature at which it becomes semi solid and loses its flow characteristics. In crude oil a high pour point is generally associated with a high paraffin content, typically found in crude deriving from a larger proportion of plant material. That type of crude oil is mainly derived from a kerogen Type II.

Pour Point Depressant

- Additive used to lower the pour point of a petroleum product.

PPM

- Parts Per Million. 1% (0.01) = 10,000ppm.

Premium Fuel

- Contains Cetane improvers detergents, dyes and other additives that can improve mileage and maintain cleaner engines. Premium fuel, in the winter, should also meet low temperature operability specifications (flow improvers, deicers, etc.).

Refining

- Series of processes for converting crude oil and its fractions to finished petroleum products.

Sediment

- Matter which settles to the bottom of fuel storage tanks scoring distress marks on sliding metallic surfaces in the form of long, distinct scratches in direction of motion.

Sludge

- A soft, black, mayonnaise-like emulsion of water and other combustion by-products.

Solvent

- Compound with a strong capability to dissolve a given substance

Ultra-low sulfur fuel

- Ultra-low-sulfur diesel (ULSD) is diesel fuel with substantially lowered sulfur content.
- ULSD has a lower energy content due to the heavy processing required to remove large amounts of sulfur from oil, leading to (1 to 2%) lower fuel economy. Using it requires costlier oil.
- As of 2006, almost all of the petroleum-based diesel fuel available in Europe and North America is of a ULSD type. The move to lower sulfur content is expected to allow the application of newer emissions control technologies that should substantially lower emissions of particulate matter from diesel engines

Water Dispersion

- Dispersion is the ability to separate and maintain a part infinitely minute, in this case a water molecule, and keep it separated from the rest of the water molecules and suspended in the fuel.
- Water contamination of diesel fuel is the biggest threat to diesel engines. All fuels contain some water in suspension, but unlike gasoline, diesel fuel and now biodiesels hold a much larger amount. This water can cause severe problems in water separators (filters), fuel injector tips, and sudden cooling in the engine which may result in shortened engine life and reduced performance, amongst other problems.
- What Xp³ does is disperse the water molecules and maintain them separated and suspended without allowing them to form a mass of water. This allows them to be burned or evaporated without causing any harm to the motor

Wax Crystals

- All diesel fuel contains wax. It is considered an important diesel component because of its high cetane value. Normally the wax is liquid in the fuel, however, when diesel fuel gets cold enough the wax starts to crystallize (i.e. solidify). If the temperature is sufficiently low, enough crystals will form to block the fuel filter and the engine can stop through fuel starvation
- Wax crystals can be visible as yellow/white deposits or as cloudiness in the fuel.

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