Advancement in HDDEO Technology

Diesel engines have been around since the start of the automotive era and have become the engine of choice for powering heavy duty commercial vehicles such as trucks and buses, agricultural vehicles, earthmoving equipment and stationary generators.

Since 1990, concern over the environmental impact of diesel engine emissions has been the main driving force for the development of the American Petroleum Institute (API) commercial 'C' engine oil classifications e.g. CF-4, CG-4, for four stroke diesel engines.

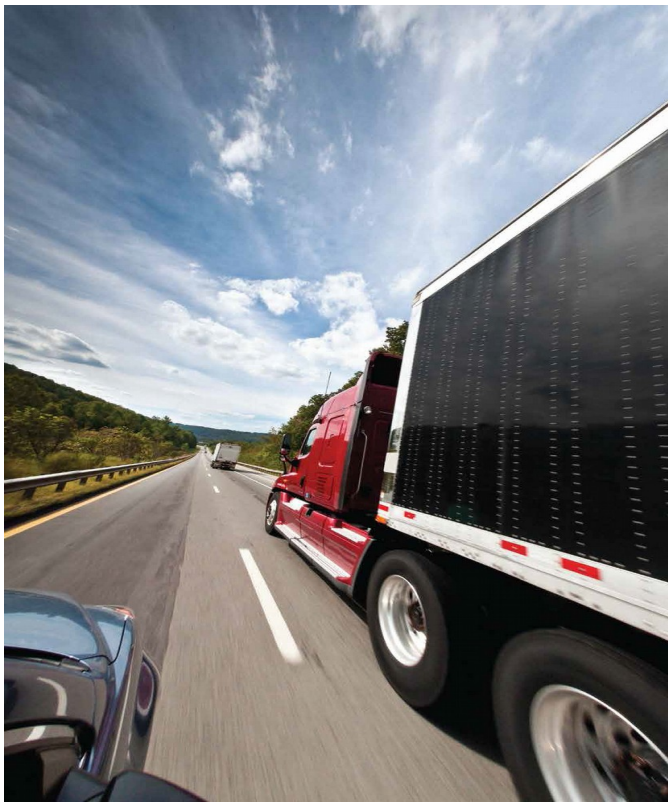
Both the European Commission and the Environmental Protection Agency (EPA) has regulated the amounts of pollutants coming out of the exhaust system of a diesel engine by adopting stringent emission standards for two key constituents – oxides of nitrogen or 'NOx' and particulate matter 'PM" which are basically soot particle. To further control emissions, the EPA also set lower limits on diesel fuel sulphur levels down to 15 ppm sulphur by year 2010.

As a result, engine manufacturers in Europe and the USA like Daimler, MAN, Cummins and Volvo have invested heavily in developing new technology to reduce emission using a combination of cooled exhaust gas recirculation (EGR) at higher rates and exhaust after treatment devices such as catalytic diesel particulate filters (DPF) and selective catalytic reduction (SCR).

These requirements have simultaneously call for a new generation of diesel engine oil classification in 2007, designated as API CJ-4 which provides emission control system durability, prevent catalyst poisoning and particulate filter blocking as well as still offering optimum protection for piston deposit control, oxidative stability, soot handling and high performance durability.

API CJ-4 represents the latest in a series of engine oil upgrades for heavy duty diesel engine oils. To ensure protection, chemical limits for sulphated ash, phosphorus and sulphur contents (SAPS) were set

at maximum limits of 1%, 0.12% and 0.4% respectively. Although SAPS contribute to significant performance benefits such as extended oil drain interval, base number retention and wear protection, they can have detrimental impact on after treatment devices in 2007-compliant emission engines.



Since 2000, more than 70 new engine specifications have emerged, including OEM specifications. The three industry drivers for HDDEO performance are to meet emissions requirements, maintain and improve engine durability under increasingly severe operating conditions, and lately the big challenge of increased fuel economy and reduced greenhouse gases.

In 2010, the National Highway Traffic Safety Administration (NHTSA) issued a regulation designed to reduce the level of greenhouse gas (GHG) emissions and mandate fuel economy improvements for medium and heavy duty engines and vehicles.

In order to address this new NHTSA regulation to be effected between 2014 and 2018, the Engine Manufacturers Association (EMA) made a request for the API to develop a new commercial engine performance category – the Proposed Category 11 (PC-11).

In addition to addressing fuel economy and GHG emissions, PC-11 is driven by:

- Increase use of biodiesel fuel
- Improved oxidation

- Improved scuffing wear protection
- Improved engine protection from aeration
- Shear stability protection

Parallel to this across the Atlantic, the arrival of Euro 6 exhaust emission legislations which is the toughest technology challenge facing the diesel vehicle industry, sees the adoption of a new test procedure certifying the new generation of significantly lower emissions of NOx and particulate material.

This together with the new dimension of improved fuel economy will add new challenges to engine hardware as well as lubricants designed to address improved engine durability and reduce exhaust emissions satisfied by the API CJ-4 and earlier categories. PC-11 will offer performance beyond the time tested API CJ-4 diesel engine oils.

What is required is thin viscosity oil which can provide better fuel economy while withstanding even higher operating temperatures with no sacrifice in durability, oxidation resistance, wear resistance and shear stability. The demand for lower viscosity, fuel efficient engine oils would see a shift from the popular SAE 15W40 oils to SAE 10W30 oils and even SAE 5W30.

However, gains in fuel economy should not come at the expense of wear protection. To meet the challenging demand of tomorrow's diesel engine oils, Lubrimaxx is working actively with leading additive suppliers to design lower viscosity engine oils which meet future fuel economy demands as well as deliver trusted wear protection and durability to all moving metal parts.

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