PCMO and HDDEO Trends

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Abstract

Industry environment: In the automotive, petroleum and additive industries we find that overcapacity, competitive pressures, and a consequent search for economies of scale are driving rationalization. Automotive manufacturers are also under similar pressures and we are seeing significant rationalization in that industry as well. The determination of companies to remain competitive despite an overcrowded market place and stiff competition means that we can expect that such rationalization will continue.

Environmental drivers: As a result of the Global Climate Conference which took place in Kyoto, Japan during 1997 we can expect the industrialized nations to reduce their greenhouse emissions to approximately 95% of their 1990 levels within the period 2008-2012. These reductions will have a significant impact on many industries including forestry, power generation, chemicals, and of course transport. Although the Protocol which emerged is not legally binding, the European Union are working with the Automotive industry to meet a European fleet average for Carbon Dioxide emission of 140g/km by 2008 – this equates broadly to a fuel economy of 6 litres/100km or 47.09mpg. Similarly the Japanese government has also proposed a 23% fuel economy improvement by 2010against the 1995 level, somewhat more severe than the European proposals. In the US although CAFE (Corporate Average Fuel Economy) standards have not been increased recently (currently @ 27.5 mpg for cars, 20.7 mpg for trucks), existing requirements continue to drive US manufacturers toward higher fuel economy vehicles, with an increasing emphasis on high fuel economy lubricant oils for passenger cars.
With regard to emission legislation, in Europe a tripartite 'Auto-Oil' program between ACEA, the Petroleum Industry (Europia) and the European Commission has resulted in proposals for decreased emissions with the principal objective of improving urban air quality standards. Increasingly severe emissions targets will be introduced in 2000 (Euro III) and 2005 (Euro IV). In Japan where the most severe NOx emission regulation is already in place further reductions are scheduled in 2002 and 2007. In the US CARB (California Air Resources Board) announced 2004 rules in which all light vehicles have same tight NOx limits, with no special accommodation for diesels. EPA announced their Tier II emissions regulations as required by the 1990 Clean Air Act Amendment, and is expected to follow CARB actions to implement a national standard for 2004.

Impacts on engines : The combination of fuel economy and emissions legislation will have a profound effect on engine and vehicle technology and will provide huge leverage towards smaller vehicles. In Europe, for example, because contemporary vehicles struggle to meet the 140g/km target design efforts are already being directed towards the 3.0litre/100km (97mpg) car in order that the less fuel efficient vehicles in the fleet can be accommodated. The most fuel efficient engines will use increasingly sophisticated electronic control systems, advanced fuel injection strategies, optimized combustion profiles and highly advanced catalyst systems to meet and exceed the fuel economy. Vehicle weight, size and aerodynamics will become critical to fuel economy, resulting in significant packaging and marketing challenges to the manufacturers. It is expected that these changes will impose significant demands on the performance of lubricants and on fuel constitution.

Impacts on lubricants : The new engine and vehicle technologies will impact on lubricant performance requirements and initiate changes in emphasis towards : enhanced fuel economy performance including its retention, sustained emissions compliance and durability, enhanced control of high temperature deposits, and enhanced resistance to the effects of combustion by-products resulting from changed combustion strategies and exhaust gas re-circulation. Further increases in oil drain intervals are also expected, resulting in further stress to the lubricant. These changing lubricant performance requirements will be addressed by emerging new specifications such as ILSAC GF-3, PC-9, ACEA E5, JASO DX-1. From a formulation view point, these requirements will likely require more use of high VI base oil and/or synthetic components, lighter viscosity grades to minimize friction losses, enhanced friction modification in gasoline engine lubricants through supplementary additives and generally more sophisticated approaches to lubricant formulation.

Industry issue : Lubricant performance demands are becoming more severe, while specification lifetime are reducing. This results in increasing development and raw materials costs of lubricants. Against this background the vision for a sustainable lubricant development activity in the future will include increasingly close cooperation between industry partners so that mutual needs may be satisfied while costs are contained at viable levels.