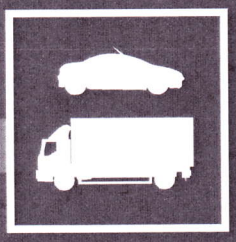
Technology For Growth Markets

TBN and Beyond



With sulphur levels in fuels being lowered, some believe that the Total Base Number (TBN) of the lubricant can also be reduced from current levels. At first glance, the thought that less sulphur leads to less sulphur dioxide, resulting in less sulphuric acid formation seems sound. Less acid to neutralise requires less reserve alkalinity in the lubricant.

So far, so good. But is this the complete picture? We believe this is an overly simplistic view and that other important factors need to be taken into consideration.

Key Factors

First, is sulphuric acid the only acid found in an engine environment? The simple answer is no. In order to meet ever-increasing emissions regulations, there have been many hardware changes in the modern diesel engine. One of these changes is the exhaust gas recirculation (EGR) through the engine combustion chamber. Although EGR has the desired effect of controlling emissions, there is the potential to increase formation of nitric acid, a derivative of the oxides of nitrogen in the exhaust gases in the engine. Obviously, this nitric acid requires neutralisation in the engine to prevent engine corrosion and other durability issues.

Another subtlety is TBN measurement. It has been measured using two different methods:

1. ASTM 2896, which is primarily used to determine the TBN of new oils, and
2. ASTM 4739, which is used to measure TBN of used oils.

TBN Testing

In a recent test program, it was demonstrated that neither of the test methods accurately quantify the effects of all different types of acids on the TBN in engine oils. For example, ASTM D2896 only responded to sulphuric acid addition and not to nitric acid or formic acid. Whilst ASTM D4739 responds to both sulphuric and nitric acids, it does not respond to organic acids. This means traditional methods to determine TBN are not telling us the whole story about acidic formation.

Summary

We believe TBN remains a key consideration in formulating engine oils. But consideration of TBN is only part of the story. Simply down-treating performance packages that in turn compromise the chemistry in the name of cost savings has dangerous implications on performance robustness, well beyond TBN. **'Chemistry without Compromise'.**

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