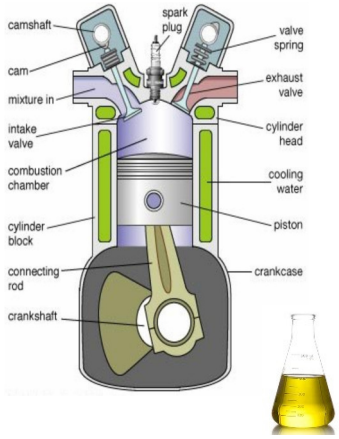
Falex Tribology Case Study 4

Quality
Knowledge
Partner Solutions

Friction Modifiers

MUST Precision Testing

- Detecting efficiency of friction modifiers with < 5%
- CoF with 0.01 level precision
- Quantify efficiency of additives



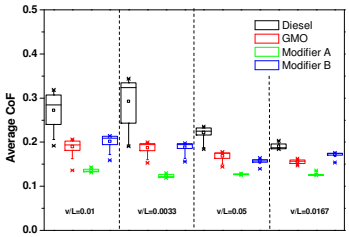
Organic friction modifiers are becoming more important for reducing friction in boundary lubrication regime. Even 3—5 % reduction in friction can have a significant impact on the overall efficiency of the engine and on the environment. As new formulations are made, the quantification of the improvement requires extremely precise friction measurements that are not possible with conventional high load tribometers. Falex MUST microtribometer with a force resolution of 0.2 µN is used to measure the friction reduction offered by organic friction modifiers when added to Base oil and Diesel fuel.

New formulations have the potential to reduce friction more than the reference Glycerol mono-oleate (GMO).

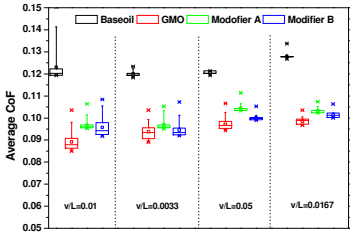
Falex MUST microtribometer offers precise friction measurements ideal for friction modifier, organic films etc.

Rotating or reciprocating tests possible.

Effect of modifiers on lubricity of Diesel



Effect of modifiers on lubricity of Base oil



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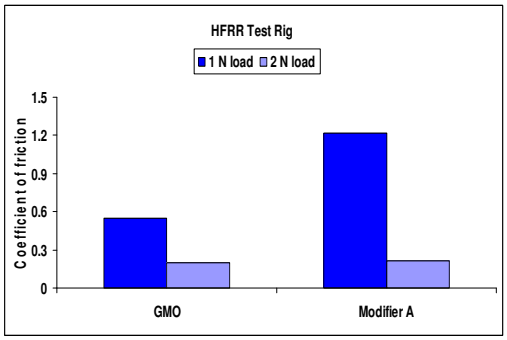
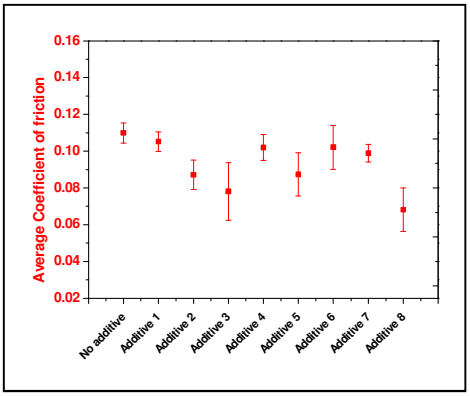
Conventional tribotesters lack the precision and sensitivity to detect small frictional differences with confidence.

Most conventional tribometers are constructed to perform wear and extreme pressure tests, with friction measurement as an add-on.

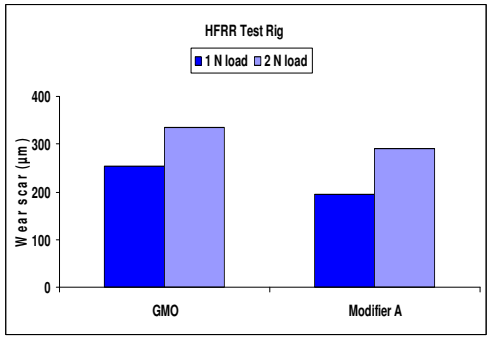


Even specialised equipment such as the HFRR (High Frequency Reciprocating Rig) for lubricity of diesel fuels and the Falex Four Ball Wear test for lubricants, relatively high contact pressures are used to obtain measurable wear.

Falex Four Ball Wear Tester



But the friction measurement is not precise enough (see figures).

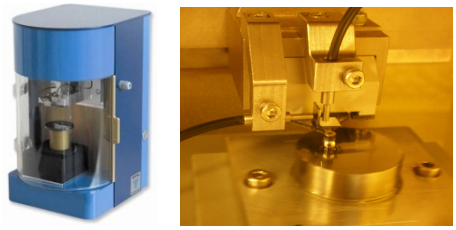


The mechanical construction needed for a friction tester must allow at least 0.1% resolution if we want to distinguish 1% differences in friction coefficient for a typical boundary lubrication coefficient of 0.1.

The Falex MUST microtribometer uses a displacement measurement of a bending element. This measurement's resolution is 0.02 µm.

When tests are done in the range of 50 mN normal load, the force resolution is 0.02 mN. This is sufficient to distinguish 1% variation in friction coefficient.

The MUST Tester



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