

A Response to a Request for Comment

Measuring Cetane Number of Diesel and Alternative Fuels

I understand that at present there are no operational ASTM D613 Cetane engines in Australia.

It is well known that the ranking of ignition quality of different types of diesel fuels is dependent on a number of variables such as engine size, type of injection (DI or IDI) and operating conditions such as speed and load. This problem becomes evident when the cetane number measured by ASTM D613 is not truly reflected in engine performance in the real world situation, as the variety of engines and operating conditions is very large. It is probable that this same ranking problem would occur with other ignition quality measurement instruments.

It would be possible to measure ignition quality of various fuels using a modified technique based on work done at CSIRO in the 1980's using a small instrumented diesel engine. CSIRO used this method for the measurement and ranking of the ignition quality of various types of diesel fuels made from crop seeds. The basis of the test was the measurement of cetane number by the now superseded IP41/60 test method. I have copies of some relevant CSIRO papers detailing this work.

When CSIRO no longer required this engine and equipment it was obtained by BHP Melbourne Research Laboratories where it was used to measure Cetane Number of coal derived liquid diesel fuels. I was in fact the operator of this engine whilst it was at BHP MRL. Whilst the engine is no longer in existence, the cost of setting up a new one with current technology measurement and recording systems should be considerably less than that of an ASTM D613 engine. Previous work has shown good correlation with the results obtained by ASTM D613.

Whilst the use of Indices such as D4737 would be a great benefit, the time taken to successfully develop new algorithms to suit the wide variety of fuel types and additives currently available in the marketplace may take years to develop.

If this technique is used, it would obviously be necessary to run a series of validation trials to confirm the accuracy and bias of the method when compared to results obtained by ASTM D613 as reported in the initial research report. These trials would include a range of different types of diesel fuels such as biodiesel, emulsified diesel and diesohol. To do such validation would take months, not years, and we believe it is a viable alternative to setting up a Cetane engine in Australia. The benefit in the use of the mentioned technique is the total cost of set up and ownership would be less, and the expertise is available at present.

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