

LUBE OIL ALKALINITY AND ITS MODELLING IN DIESEL ENGINES

by
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CERTIFICATE

This is to certify that the thesis entitled, "Lube Oil Alkalinity And Its Modelling In Diesel Engines" being submitted by Gyanendra Kumar Sharma to the Indian Institute of Technology, Delhi, for the award of 'Doctor Of Philosophy' is a record of bonafide research work carried out by him. Gyanendra Kumar Sharma has worked under my guidance and supervision and has fulfilled the requirements for the submission of this thesis, which to my knowledge, has reached the required standard.

The results obtained in this thesis have not been submitted to any other University or Institute for the award of any degree or diploma.



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I dedicate this thesis to my parents.


(Gyanendra Kumar Sharma)

ABSTRACT

Lube oil alkalinity or its total base number (TBN) value depletes in a diesel engine as the alkaline additives incorporated in the lubricant formulations are gradually exhausted to neutralize the acidic products of combustion. Modelling for the trends of TBN depletion has been attempted in the present study and the two models have been proposed-

(i) A 'simulation model' relating the non-dimensional parameters of TBN and time has been developed. The model has been shown to be capable of predicting the performance of various formulations in actual engine service, on the basis of their comparative evaluation in a proposed laboratory test rig.

(ii) A 'service model' has also been developed to predict the trends of TBN depletion as a function of variables of engine design, fuel sulphur, oil composition.

The validity of these models has been verified on the basis of the correlation coefficient and the Chi-square statistical tests. It has further been shown that the models can be conveniently adopted in practice as the predictions are found to vary from the experimental data within the reproducibility limit allowed in the method for TBN determination. Utility of the models for the oil formulators and the user industry has also been demonstrated.

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