

DIESEL LUBRICATING OIL TEST CENTRE

BY

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ABSTRACT

The present RN diesel engine lubricating oil test kit was introduced in the mid 1960s. Advances in additive packages have complicated the formulation of oils to the point where the present test kits are inadequate for the task. In addition, the adoption of condition based maintenance practices require a trending capability which the present test kit cannot offer. As a result of an evaluation exercise, the MoD will carry out a minor trial of Unitor test centres to determine their suitability for widespread use in the Fleet.

Introduction

Discussions with the Fleet Engineering Staff (now FOSF) and the Fuel & Lubricant division of the Defence Research Agency Quality Assurance Technical Support, approximately three years ago, identified a requirement for a more advanced lubricating oil test kit than the one in present use. The current design has been in service since the mid 1960s, when diesel lubricating oil formulations were much less complicated than those in current use. It was designed as a simple 'go/no go' system, which was very subjective, labour intensive and required dedicated shore support to diagnose the extent of problems.

Over the past thirty years the power from engines has increased tremendously while maintaining the same footprint. This has been achieved through improved turbocharging technology and the adoption of increasingly sophisticated materials, which can withstand higher temperatures and pressures. To cope with the harsher regime, lubricating oils have become increasingly complex and have the ability to prolong engine life. The adoption of condition based maintenance (CBM), requires the ability to trend results from health monitoring tests. The present lubricating oil test kit does not allow for trend monitoring, nor are the tests aimed at determining the properties given to the oils by the complex additive packages. As this capability is necessary to manage our engines better, it was decided to investigate what was commercially available.

Evaluation

Three test kits were chosen for evaluation. The initial two were based on traditional systems, which rely on subjective assessment of results and had additional shortcomings which made their adoption less than satisfactory. The manufacturer of the third kit, the UK branch of the Norwegian company UNITOR, was keen to develop a system that the Royal Navy could use. They presented an initial idea with a prototype and then developed a lubricating oil test centre, which is very appealing from an engineering viewpoint as it relies on objective measurements of physical quantities. The tests conducted are:

Water in oil.

Total base number (reserve of additive prior to oil becoming acidic).

Viscosity of oil corrected to 40°C.

The percentage of insolubles present in the oil.

The final standard, known as the Mark 1 MOD, is shown in (FIG. 1).



FIG. 1—LUBRICATING OIL TEST CENTRE -(MARK 1 MOD)

Minor Trial

Based on the evaluation, it was decided that a number of centres would be purchased and distributed among ships to carry out a minor trial. Centres have now been delivered, and the year long practical evaluation of the concept has started. It is hoped that the physical tests from the centres will be validated against the laboratory tests carried out under the Extended Diagnostic & Maintenance System (EDMS) minor trial and thus, facilitate the introduction of a new generation test centre to the Fleet.

Conclusion

As a result of almost three years of effort, by a variety of agencies, a new generation diesel lubrication oil test centre is being introduced as a minor trial to a number of ships. If the results are satisfactory, a centre will be introduced which should aid in the goal of implementing CBM in diesel engines and improve the assessment of engine condition.