Aspects of Lubricant Oxidation

Stadtmiller/Smith
editors

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ASPECTS OF LUBRICANT OXIDATION

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Foreword

The papers in this publication, *Aspects of Lubricant Oxidation*, were presented at the Symposium on Oxidation held 5 December 1983 in Miami, Florida. The symposium was sponsored by ASTM Committee D-2 on Petroleum Products and Lubricants and its Subcommittees D02.C on Turbine Oils and D02.9 on Oxidation. W. H. Stadtmiller, Exxon Research and Engineering Company, and Andrew N. Smith, General Electric Gas Turbine, were symposium chairmen and are editors of this publication.

Related ASTM Publications

ASTM and Other Specifications for Petroleum Products and Lubricants, 4th Edition, 1985, 03-402384-12

Distillate Fuel Stability and Cleanliness, STP 751 (1981), 04-751000-12

Significance of ASTM Tests for Petroleum Products, STP 7C (1977), 04-007030-12

A Note of Appreciation to Reviewers

The quality of the papers that appear in this publication reflects not only the obvious efforts of the authors but also the unheralded, though essential, work of the reviewers. On behalf of ASTM we acknowledge with appreciation their dedication to high professional standards and their sacrifice of time and effort.

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Overview

The Symposium on Oxidation was sponsored by ASTM Committee D-2 on Petroleum Products and Lubricants and its subcommittees D02.C on Turbine Oils and D02.09 on Oxidation. Four papers were presented, and all four appear in this publication entitled *Aspects of Lubricant Oxidation*.

Smith reports on how in the early 1970s failure of conventional turbine lubricating oil in modern heavy-duty gas turbines fostered the development of high-temperature mineral oils, the search for appropriate more severe oxidation tests, and efforts to relate the experience to tests and analysis. He also discussed the bearing and bearing seal developments which were undertaken parallel with this lubricant effort. He came to the conclusion that oil characteristic curves and exposure temperature provide life predictions.

Hsu, Ku, and Pei state that lubricant degradation under in-service conditions can be traced to oxidation. They showed how simple oxidation test environmental factors such as metal catalysts, fuel components, and oxides of nitrogen are systematically studied. They conclude that the environmental factors not only have significant influence on the rate of oxidation, but also on the oxidation pathway of how lubricants degrade.

Varne describes in detail the oxidation test methods developed by ASTM Subcommittee D02.09. This subcommittee develops methods and equipment to measure thermal and oxidation stability of fuels, lubricating oils, and greases. He discusses the existing ASTM oxidation test methods for petroleum products and the status of new methods.

Coates and Setti illustrate how modern infrared spectroscopy can be used to monitor lubricant degradation. They also demonstrate by simple applications how the technique has the potential for providing much of the information required to follow the chemical reactions that are involved.

Thus through these four papers the reader gains a knowledge of (1) high temperature mineral oils; (2) lubricant degradation under in-service oxidations; (3) the functions of ASTM Subcommittee D02.09; and (4) the rise of modern infrared spectroscopy in monitoring lubricant degradation.

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