

## Lubrication Fundamentals

Second Edition, Revised and Expanded by D. M. Pirro, ExxonMobil Corp. and A. A. Wessol, Consultant, Marcel Dekker, Inc., 2001. Hard cover, 540 pages.

**Reviewer: Dr. Robert M. Gresham, TLT Contributing Editor**

I was extremely pleased to see this book when it came across my desk. When I first entered the world of tribology and lubrication engineering in 1981, one of the key references, in fact we called it "The Bible," was *Lubrication Fundamentals*, the first edition. This book was largely written and edited, but with the help of many, by J. George Wills of Mobil Corp. in 1980. It has stood the test of time. It is also a key reference used in the "Body of Knowledge" for preparation for the CLS® (Certified Lubrication Specialist) exam.

This 2nd edition of the book should be on the desk of those in our industry who are responsible for understanding the basics of lubrication in automotive and industrial applications. *Lubrication Fundamentals*, easily readable by both lubricant sales and plant maintenance people, provides the foundation of knowledge on what lubricants are, how they work, many of the applications where lubricants are used, and the factors affecting lubrication in these applications. However, as it is not a "How to" book, supplementary references would be needed for specifics in a given area.

Much has happened in our field over the last 20 years. This new book, like its predecessor, does an excellent job of codifying the very basic concepts in concise, readable English and adds some of the nuance of our expanding knowledge. The authors have added three new chapters,

expanded chapter 2, "Lubricating oils," to include automotive engine, gear, and transmission fluids, and split into its own chapter the subject of refining and base stock manufacture including the newer base stock classifications. There is a new chapter on "Environmental Lubricants," which was a pipe dream in 1980, but now a reality. Also, there is a new chapter on Hydraulics, which was a glaring weakness of the first edition.

The remaining 16 chapters are much as they were in the previous edition. Most of the drawings, diagrams, etc., are the same, but then our fundamental understanding has not changed significantly, either. The chapter on Synthetic Lubricants is much improved reflecting the changes in this area. Specifically there is a table on synthetic lubricants showing specific lubricated equipment, the operating conditions and how a synthetic can provide an advantage, but it doesn't directly tie the advantages to specific oil chemistry. There is another table showing advantages and limits of oil types versus mineral oil, but it seems that these could be related and easier to assimilate. Also, cost considerations needed to be treated better. Nevertheless, this chapter helps put these fluids into perspective.

The chapter on Internal Combustion Engines has also been expanded as would be expected, to pick up the newer API Engine Service Classifications. The Nuclear Reactor and Power



Generation chapter was shortened, which, not being my field, I shouldn't comment on.

I would have preferred to see a new chapter on tribological coatings, both lubricating and wear resistant. Additionally, since condition monitoring and sophisticated maintenance programs have made significant gains in recent years, and will continue to do so, a chapter on this topic as it pertains to lubrication is needed. Furthermore, a chapter on future trends, both regulatory and technical, would have been of help as well. It is always difficult to know where to draw the line, but these seem important.

In summary, I think this book is, as its first edition, a key foundation reference on which to build and makes for interesting reading. <<