

New Directions in Lubrication, Materials, Wear, and Surface Interactions, Sub-Title – Tribology in the '80s, William R. Loomis, Editor, Published by Noyes Publications, Mill Road at Grand Avenue, Park Ridge, New Jersey 07656. Price: \$69.00, Publishing Date: 1985.

REVIEWED BY WARD O. WINER¹

The title of this book is rather pretentious and will be misleading to anyone who purchases the book on the basis of the main title alone. The book is actually the proceedings of a conference held at NASA-Lewis Research Center in April 1983. This reviewer attended the conference and found it to be one of the more stimulating conferences in tribology that I have participated in in several years. Upon reading parts of these proceedings, I find the whole event to have been very worthwhile. The sub-title would have been much more appropriate, namely, "Tribology in the '80s." The book is a valuable document because it not only contains a large number of invited, and mostly excellent, papers by major people in the field, but also contains a great deal of discussion. The discussion is a very important part of the document. Anyone currently in the research or development aspects of tribology, or considering getting into tribology, should have this document available to them and should read it.

Of the 311 attendees at the conference, 72 came from 14 different countries. It was a very representative group of the current major participants in the field of tribology. There were 36 invited presentations and considerable invited and spontaneous discussion, all of which is presented in the proceedings. The attendees, as well as the people writing material in the proceedings, were not only internationally representative but also well distributed from among academic, government, not-for-profit, and industrial laboratories. The material presented represents the full spectrum from fundamental research information to very applied engineering information. An indication of the breadth of the contents is given by a list of the nine parts into which it is divided. First is an invited introductory lecture on "The Status and Direction of Tribology as a Science in the '80s – Understanding and Prediction" given by David Tabor. Following that there are eight parts containing a number of papers in each. These parts are:

1. Importance and definition of materials in tribology
2. Future directions of research in adhesion and friction
3. Future direction of research in wear and wear resistant materials

4. The future for liquid lubricants and additives
5. Status and new directions in elasto-hydrodynamic lubrication
6. New directions for solid lubricants
7. Tribological materials for mechanical components of the future

and the ninth part, and most possibly the most interesting for initial reading, was the conference summation and discussion.

The conference summation and discussion was prepared by Don Hays of General Motors Research. He first presented his own overview of the conference which was followed by summations of all the invited papers. Those summations were then followed by prepared discussions that had been invited for particular areas. This summary is the first thing that readers should turn to to get an excellent overview of the conference and the field. I would take issue with one thing that Don Hays says at the beginning and that is "I have prepared a summary of the conference, a distillation of concepts, . . . , that few will read, . . .". I read it and I recommend every other tribologist should also read this section.

The conference and the proceedings are dedicated to Ed Bisson, who retired from NASA-Lewis in 1973 and is still active in the field. The tribology group at NASA-Lewis exists to a large extent because of the pioneering spirit of Ed Bisson. The subject matter covered in the conference is very wide ranging as are Ed Bisson's interest and the group at NASA that he founded. The conference was a fitting honor to him.

The conference filled an important need that existed in tribology and exists in many other fields of technological development today. That need is to sit back and reflect on the state-of-the-art and to decide where we are going. To write reviews or to discuss an area is rarely done these days, but is badly needed. This conference managed to do both in a very wide range of topics related to tribology and in that regard it is an important document in the tribology literature.

Although I did not read the entire document from cover to cover, it is curious that the book begins with and almost ends with quotations from the same person, Henri Poincare. The one at the beginning, which was used by David Tabor to begin his article, is

"It is better to predict without certainty than never to have predicted at all."

and the one near the end was introduced by Don Hays in his summation and conclusion of the conference which reads

"Science is built up with facts, as a house is with stones. But a collection of facts is no more a science than a heap of stones is a house."

Both of these quotes are appropriate for the field of tribology in the mid-1980s. This conference and its proceedings are a real contribution to the field and are recommended reading for all serious tribologists, no matter what part of the spectrum of tribology they come from.

¹School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, Ga.

• Tribology “ the study of friction, wear and lubrication of interacting surfaces in relative motion. Friction: • Barreling in compression test • In forging, rolling, sheet metal forming and machining • Friction “ the resistance to relative motion between two bodies. in contact. • The direction of barreling depends on the relative motion of the cylindrical surfaces with respect to the flat dies. (b) Test results: (1) original specimen, and (2-4) the specimen under increasing friction. • (a) High local stresses plastically deform the material in the vicinity of the contact points, resulting in the formation of atomic bonds across the interface. (b) As the force causing the relative sliding motion is increased, the shear stress in the joined region increases until it exceeds the shear strength of one of the solids.