

# Introduction

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The antifriction bearing industry has been rapidly internationalized in recent years. Bearing companies in the United States have established manufacturing plants overseas, and foreign companies are doing likewise in the U.S. The boundary dimensions of many types of bearings have long been standardized by International Standards Organization (ISO), and the standardization has greatly facilitated the international trading of bearings and exchange of bearing knowledge.

Approximately 30 to 40 percent of the bearing manufacturing cost is in the material. The quality of steel has a profound effect on the bearing life. Although the chemistry of bearing steels, particularly the high carbon-chromium steel, has only a insignificantly small variation from country to country, the method and limits for the qualitative test of bearing steel vary greatly. The rating of nonmetallic inclusions is considered by most bearing metallurgists and engineers as one of the most significant tests for bearing steels. Unfortunately, it has not been standardized.

In May 1973, the ASTM Committee AO1.28 on Bearing Steels passed a resolution to sponsor an international symposium on rating of nonmetallic inclusions in bearing steel. A symposium committee was formed by representatives from major domestic bearing steel manufacturers and internationalized bearing companies. Invitations were sent to bearing and bearing steel manufacturers in the major industrial countries, and the responses were entirely enthusiastic. Many distinguished foreign scientists and engineers immediately responded favorably by attending the sessions of this three day symposium, and presenting many papers. Their participation formed the essential core of the symposium, and their contribution to the symposium is greatly appreciated.

The papers reflect the state-of-the-art review of nonmetallic inclusion ratings in the major industrial countries, the thinking behind their method, the comparison of various established rating methods, the effect of melting practices on inclusion formation, and the testing results of the effects of various types of inclusions on the bearing fatigue life. Several new rating techniques are also reported.

The symposium had, for the first time, gathered in one room all researchers and specialists on the subject from different countries and companies. This book is also the first of its kind in the world. The symposium did not intend to reconcile the differences among countries. It

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was recognized after the symposium that there will probably be many years before a unified international standard can be established. Through the presentation of various viewpoints and the exchange of opinions, it is believed that a significant first step has been taken toward that goal.

This book is a good reference for all engineers and metallurgists working with antifriction bearings. The papers are both informative on the up-to-date knowledge and stimulative to thinkings about improvement for the future. Many inadequancies and deficiencies of the existing methods are exposed for the first time. Directions for future research efforts are thus indicated.

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