



Introduction

At the 1937 ASTM Symposium on "Wear of Metals," the wear of a metal part was defined by H. W. Gillett as "its undesired gradual change in dimensions in service under frictional pressure." It was reported at this symposium that "the phenomenon of wear is so complex that it is extremely difficult to interpret, and is one kind of service for which suitability can be reliably evaluated only in terms of actual service tests. Various wear tests have been used for specific purposes, but are only valid if the test method produces wear in the same manner in which it is produced in service."

The ASM Subcommittee on Wear of Metals contributed a 10,000-word article to the 1948 edition of *Metals Handbook* that did not mention the word "Tribology"! However, it did describe many kinds of wear test methods that were then known; including block-on-ring, pin-on-disc, dry sand abrasion, and others that modern tribologists depend upon. The article observed that, "Such a variety of tests and test conditions is bewildering. The selection of a wear test is logically based on the type of service and conditions involved; and the test should simulate these as closely as possible."

The subsequent half century has seen exponential growth in our knowledge of wear and our understanding of wear processes. Whether or not today's picture is any less bewildering, this knowledge growth has made possible the development and commercial availability of specialized wear-resistant "tribomaterials" as well as the ability to utilize more conventional metallic materials with greater certainty of adequate wear resistance in service.

Much more remains to be learned about wear fundamentals and principles, and much more of what has already been learned needs to be made more understandable and useful to practicing engineers and designers. The papers that are presented in this issue of *Journal of Materials Engineering and Performance* address both kinds of concerns. These papers were presented originally as part of the programming for ASM International Materials Week '93, October 1993, in Pittsburgh, Pa. Six technical sessions were held on Friction and Wear topics, sponsored by the Surface Engineering, Materials Science, and Specialty Materials Divisions. The papers published in this journal comprised two sessions on Wear Resistance of Metals and Alloys, organized by the Wear Resistant Materials Group of SMD:

Engineering Applications

chair

George R. Kingsbury, George R. Kingsbury P.E. Inc.

Principles and Laboratory Applications

chair

Dr. Sara Dillich, U.S. Bureau of Mines

George R. Kingsbury

Editor's note: *In addition to the three papers which follow in this issue, the following papers are also part of this symposium.*

"Effect of Nitrogen Alloying on Microstructure and Abrasive Wear of Stainless Steels," by J.A. Hawk, J.W. Simmons, and J.C. Rawers, was published in Volume 3, No.2 (April 1994).

"Wear Resistance of Ductile Irons," by Yury S. Lerner, was published in Volume 3, No.3 (June 1994).

"A Study of the Behavior of Boron Diffusion in Plain Carbon Steels," by Lichun Qian and Glen A. Stone, and "An Impact-Wear Tester for Railroad Track Castings," by Timothy J.N. Smith, William B.F. Mackay, and Reginal W. Smith, will be published in subsequent issues.