Book review

Materials Degradation and its Control by Surface Engineering, 3rd Edition

A. W. Batchelor, L. N. Lam and M. Chandrasekaran. Imperial College Press, London, UK, 2011, ISBN 978-1-84816-501-4, 420 pp.

Understanding and preventing material corrosion and wear is a crucial, but often neglected, component of engineering education. Corrosion textbooks generally lack discussion on advanced surface treatments, even though it is important to expose engineers and students to an array of available degradation prevention techniques. For this reason, the third edition of *Materials Degradation and its Control by Surface Engineering* addresses an important curricular deficiency.

The first half of this textbook introduces the reader to degradation phenomena at a third- or fourth-year undergraduate level. Phenomena such as sliding contact, aqueous corrosion, liquid metal corrosion, irradiation and so forth are briefly reviewed. For a student to whom these topics are unfamiliar, the introduction is gentle but of sufficient depth to frame the second half of the book. Instructors will likely supplement some sections with relevant literature to emphasize certain aspects of wear and corrosion.

In the second half of the book, a wide spectrum of coating methodologies, associated characterization techniques, control and economic aspects of coatings are examined. The authors provide a useful overview of many relevant surface modifications, including organic coatings, electrochemical coatings and metallurgically important treatments (i.e. galvanization and carburizing, among others). The treatment of these techniques is, again, brief and basic enough for undergraduates to whom these topics are new. The authors make use of general nature of this text by including several comparison/selection tools, such an effectiveness matrix, coating

depth comparison chart and characterization method comparison table. Unfortunately, these useful tools are unlinked in discussion and scattered throughout multiple chapters. The lack of a unified “coating selection” section is a missed opportunity in this textbook and would be an asset to the reader. The first appendix, which tabulates relevant American Society for Testing and Materials standards for myriad coating processes, is a valuable section. This publication seems interesting as an educational textbook, but it may not be attractive to experts (e.g. corrosionists and surface engineers) as an in-depth reference.

The figures in this textbook are of subpar quality. The vast majority of diagrams appear dated, and photographs and photomicrographs are too dark in print to be useful to the reader. Some figures reproduced from the literature are of reduced resolution and are difficult to read. While the book is generously illustrated, some illustrations could be replaced by modern renderings to enhance student understanding.

Overall, this textbook is strong in its presentation of difficult concepts and in its unification of phenomenological description, coating technology and characterization methods. This could make *Materials Degradation and its Control by Surface Engineering* attractive as an undergraduate course text. Before use, however, instructors must weigh the book’s aforementioned strengths with its substantial cost, substandard figures and lack of questions and problems.

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