

Book news

1. Book reviews

● *Stainless Steels '84*. London, Institute of Metals, 1985. £39 (U.K.), US\$62 (elsewhere)

Reviewer: J.H. Dalton

This publication is a record of the proceedings of a conference that was held at Chalmers University of Technology, Göteborg, Sweden, in September 1984, and that was organized jointly by Chalmers University of Technology, Jernkontoret (Sweden), and The Metals Society (U.K.). The intention of the Conference was to provide a forum for research scientists and engineers who work with stainless steels and, as part of the theme, to address itself to applications of stainless steel in the energy industry.

According to the foreword, there was an overwhelming international display of interest in this Conference, and eighty papers were finally selected for presentation as oral or poster contributions. The presentations were organized in six half-day sessions covering

- Physical metallurgy
- Behaviour in corrosive environments
- Welding
- Generation of nuclear power
- Recovery of oil and gas
- Generation of thermal power.

The proceedings contain seventy-one of these contributions. Each section starts with a keynote address, which gives a review of the subject and sets the theme for the section.

The first section, that on the physical metallurgy of stainless steels, consists of fifteen papers, which cover the full gamut of stainless types—from austenitics and ferritics, through the duplex, to the lower-chromium martensitics and dual-phase steels—and deals with the influence of grain size, microstructure, alloying elements, and precipitation processes on the various properties. Of particular interest to the South African reader are the papers by McKenzie *et al.* on the structure and properties of duplex stainless steels containing platinum-group metals and by Brink and Ball on the mechanical properties of 3CR12.

The majority of the papers in the second section deal with compositional effects on corrosion resistance. The topics include the effects of calcium additions on pitting initiation in ferritic stainless steels; the influence of copper and niobium, rare-earth metals, boron and chromium, and molybdenum additions in austenitics; and the α/γ ratio in duplex steels. Other topics of interest include stress-corrosion cracking, passivation, and the composition of passive layers.

The third section, dealing with the welding of stainless steels, shows a good mixture of research and engineering applications in the thirteen papers presented. On the engineering side, the topics include the welding of high-molybdenum austenitics, welding consumables for high-temperature weldments, methods of improving TIG weld penetration, and welding methods and filler metals for duplex stainless steels. In a more scientific vein, the papers are concerned mainly with the effects of microstructure,

phase transformation, and residual and alloying elements on the corrosion resistance of weld metals. One of the more unusual papers in this section is that by Lamb *et al.*, dealing with the effects of structure and residual stresses on laser-surface-melted stainless steels.

Sections four and six deal exclusively with the field of power generation, the former with nuclear power and the latter with thermal power. These papers are highly specialized and deal mainly with the development of stainless steels for these applications, and with related research on mechanical behaviour, precipitation phenomena, and alloying effects.

The subject of section five, oil and gas recovery, could be of great local interest in the future, with the announcement of the development of South African off-shore gas fields. The nine papers in this section mainly cover the properties and corrosion resistance of steels specially developed for the unique problems of 'topside' and 'downhole' applications, mainly offshore applications.

As the subject matter of this Conference covers a wide spectrum of stainless-steel types and applications, there is little doubt that this publication contains topics to interest everyone in the research, development, engineering, and materials-selection fields. The keynote addresses give an excellent introduction to each of the sessions, and the presentations selected give a fair idea of what are regarded in the world today as important topics and problems in stainless steel. It is a great pity that the reports of the session discussions were not available at the time the proceedings went to press and therefore do not appear in the publication. However, there is no doubt that the aims of the conference were admirably achieved, and it is difficult to imagine that anyone in the stainless-steel business, in whatever capacity, would not have this publication gracing his bookshelf.

● *Process engineering of size reduction: ball milling*, by L.G. Austin, R.R. Klimpel, and P.T. Luckie. New York, AIME, 1984. 561 pp.

Reviewer: M.J. Lazer

This book presents the fundamental concepts and calculation procedures used in milling in a precise, eminently readable manner, proceeding readily from the older laws of grinding to a detailed description of the size-mass balance approach to milling simulation.

The 19 chapters of the book are introduced by an explanation of the decisions facing the design engineer in choosing a milling circuit. This is followed by a discussion of the older laws of grinding, in which they are shown to be empirical and their scientific basis suspect. A detailed description of the Bond method of mill sizing is given as an example of the older methods and, in a later chapter, the links between the size-mass balance approach and these older methods are shown.

The authors then proceed to their major topic: the size-mass balance approach to milling simulation. This is introduced by the development of a batch grinding equation, together with proof of its applicability. Empirical relationships between the various milling parameters and the parameters in the batch grinding equation are developed from laboratory batch grinding tests. The approach is then extended to continuous open

and closed milling circuits. Its advantages in the simulation of milling circuits is demonstrated by the use of examples in which different circuit arrangements, classifier efficiencies, and circulating loads are evaluated. The authors comment on the shortcomings of these simulations, and indicate how they can be overcome. For example, allowance should be made for overfilling of the mill at high circulating loads. A more detailed description of various topics is then given, including techniques for determining the selection and breakage functions for a given milling installation, whether batch or continuous; the theory of power in tumbling ball mills, ending with a summary of the empirical relationships available; classification; residence-time distributions; ball wear and selection of ball size; and grinding aids. A useful chapter is included on the economics of grinding processes and, in the final chapter, different extremes of mill operations are compared by the use of simple analytical solutions to the grinding equations.

The book therefore substantiates the authors' claim that 'it stresses the fundamental concepts and calculation procedures for size reduction in mills rather than equipment selection or mechanical design'. For, although the size-mass balance approach is shown to be obligatory in predicting the effect of changes to a given circuit, the scale-up from batch results is still done empirically, and the design engineer must still rely on work indices and manufacturers' catalogues in choosing a mill. However, new insight is given by the size-mass balance approach to circuit design and the optimization of existing circuits.

The book is written in a style that makes it easy to read, and the summaries at the end of the chapters are useful for later reference and confirmation that the reader has grasped the authors' message. Unfortunately, the rhythm of reading is continually disturbed by a search for the meaning of symbols. The nomenclature is consistent throughout, but a key at the end of the book would have been useful. The book is therefore suitable for lecturers presenting a course on unit operations in mineral processing, and would be an excellent text for a specialized course on milling. The book is almost a necessity for anyone entering the field of milling research, whether it involve ball milling or any other form of milling.

2. Recent publications

● *Hard and superhard materials*. New York, Worltech Report Inc. (44 Woodbine Avenue, P.O. Box 212, Northport, 11768 U.S.A.), 1985. 270 pp. \$1500.

The materials featured in this report have a Knoop hardness greater than 1000, and include traditional and advanced ceramics, tool steels, cemented carbides, diamonds, and cubic boron nitride. The current U.S. demand is about 880 million pounds, worth \$1 billion. The

consumption is now 11 per cent lower in volume, and 21 per cent lower in value, than it was in 1980, despite a 17 per cent rise in industrial production. This drop in usage has come as a result of enormous advances in the performance and productivity of these materials. According to the report, many segments of the hard and superhard materials market will grow dramatically between 1985 and 1990. Products with the greatest potential include polycrystalline cubic boron nitride, powder-metallurgy tool steels, cermets, polycrystalline diamonds, and silicon nitride-based ceramics. The report covers the technologies, markets, applications, opportunities, prices, and competitive conditions for these materials.

● *International comparison of standard materials—steel and cast iron*, compiled by W. Otto and K. Schänning, and edited by DIN German Standards Institute e.V. Berlin, Beuth Verlag GmbH, 1985. 3rd edition, 416 pp. DM 158.

This trilingual work (German, English, and French) has already proved its usefulness in practice and is now in its third edition. In total, 65 per cent of the data have been amended, thus bringing this edition up to date with the latest technical developments. Easy-to-grasp tables show, juxtaposed, the physical and chemical properties of standardized iron and steel materials from Germany, France, the United Kingdom, Italy, Sweden, Spain, the U.S.S.R., the U.S.A., Canada and Japan, as well as including materials as specified in Euronorms and international standards. All the values are given in SI units or according to standard scales.

● *Tin and its uses* no. 146. Greenford (England), International Tin Research Institute, 1985.

This issue features the following as its main topics: tin and tin alloys for connector finishes, the planning of a can-making factory, electrolytic bronzing of aluminium by use of tin electrolytes, the 22nd French Tin Day, tin chemicals in fire-fighting, and solder for art's sake.

● *Write your own CV*, by Max Kowen. Johannesburg, Legal Personnel Selections (404 Medical Centre, Cnr Jeppe and Delvers Sts, Johannesburg 2001), Nov. 1985. 40 pp. R12,50 + GST.

This Guide, which is described as 'an expert guide for the job-hunter and career-improver in South Africa', was written by the founder and managing director of one of the fastest-growing personnel consultancies in South Africa. The author starts by explaining the meaning of *curriculum vitae*, together with its uses and advantages; he then goes on to outline the contents of a CV with detailed comments on each item. The Guide also gives examples of the covering letter that should accompany a CV, and useful tips on job-hunting.