



PUBLICATIONS CATALOG

Bookstore.AIST.org

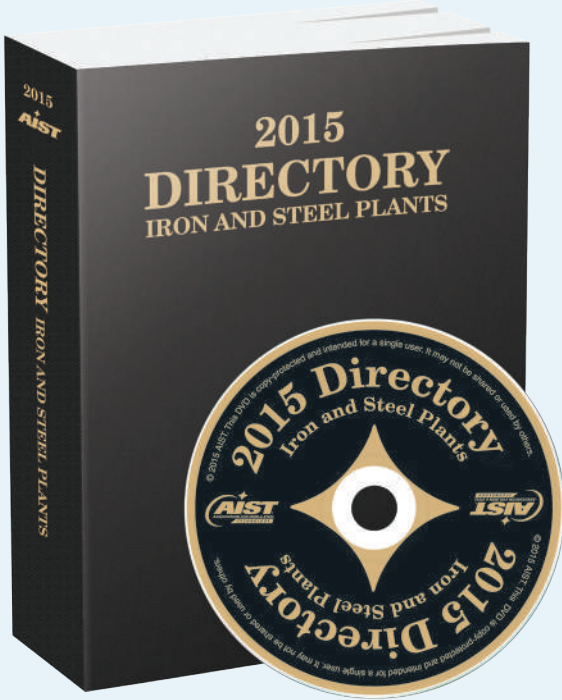


CONTENTS

■ ■ New Releases	3
■ ■ General Steel Publications	4
■ ■ Steel Grade Reference Manuals	17
■ ■ Wall and Interactive Maps	19
■ ■ Technical Reports	22
■ ■ AISTech Proceedings	24
■ ■ MS&T Proceedings	25
■ ■ Past Proceedings	26
■ ■ Historical Perspectives	28
■ ■ Coming in 2015	29
■ ■ Technology Training Conferences	30

HOW TO ORDER

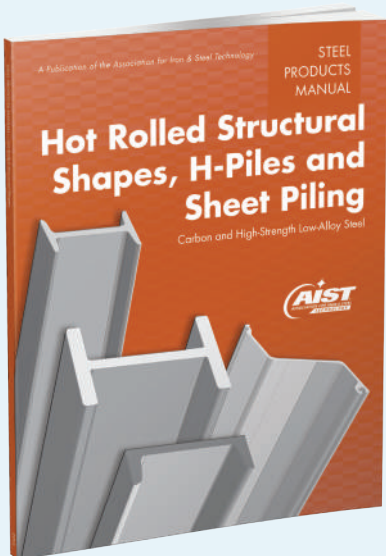
- ■ Bookstore.AIST.org
- ■ +1.724.814.3000, ext. 1
- ■ memberservices@AIST.org



2015 Directory Iron and Steel Plants

The *2015 Directory — Iron and Steel Plants*, available with a searchable DVD, is the “black book” known industry-wide for its comprehensive details on North American steel producers and suppliers from around the world. The Directory includes information on capacities, products and equipment for more than 1,500 companies and 15,000 key personnel, with easy-to-use geographical indexing. The newly updated facility tables are now organized by facility type, allowing users to locate plant information quickly and efficiently. A listing of associations and technical societies is also included.

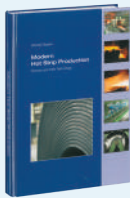
ISBN: 978-1-935117-44-5
 2015, Softbound w/DVD — DIR-15
 Member Price US\$95
 Non-Member Price US\$135



Hot Rolled Structural Shapes, H-Piles and Sheet Piling: A Steel Products Manual

This manual represents the manufacturing practices and related scientific and technical information of the many steel producers which have been reported. Contents include metallurgical aspects, manufacturing methods and practices, structural quality descriptions, specifications and tests, permitted variations (tolerances), and steel sheet piling. Additional reference information includes grain size, atmospheric corrosion, material property survey, mill markings, surface imperfections, carbon equivalent, toughness, curving shapes and galvanizing shapes.

ISBN: 978-1-935117-40-7
 2014, Softbound — PB-221
 Member Price US\$40
 Non-Member Price US\$70



Modern Hot Strip Production

Michael Degner

This book contains contributions and references to the quality improvement, to the increase of plant availability and the yield, to the conservation of resources during production, as well as to automation, control and metallurgical plant concepts in the rolling of hot strip. There are published summaries of technical papers presented at international conferences and published results of papers and patents.

ISBN: 978-3-514-00808-3
 2014, Casebound — PB-VDEH-032
 Member PriceUS\$102
 Non-Member PriceUS\$145



ASM Handbook, Volume 4B: Steel Heat Treat Technologies

Jon Dossett and George E. Totten, editors

Volume 4B expands coverage on equipment, control, troubleshooting and problems associated with steel heat treating. New articles extensively address distortion and the prevention of cracking — including the modeling and simulation of distortion. Furnace equipment and controls are described in detail, along with quenching systems and characterization of quenchant. General process and procedure factors also are introduced — including temperature uniformity of furnaces, calculation of heat treating costs and decarburization.

ISBN: 978-1-62708-025-5
 2014, Casebound — PB-ASM-027
 Member PriceUS\$219
 Non-Member PriceUS\$289



ASM Handbook, Vol. 4A: Steel Heat Treating Fundamentals and Processes

Jon Dossett and George E. Totten, editors

Volume 4A introduces the basics of steel heat treating and provides in-depth coverage of the many steel heat treating processes. Editors and authors have also added charts, examples, and practical reference data for application purposes to the 50 articles included in the volume.

ISBN: 978-1-62708-011-8
 2013, Casebound — PB-ASM-026
 Member PriceUS\$219
 Non-Member PriceUS\$289



ASM Handbook, Vol. 15: Casting

This newly revised handbook on modern casting technology is a comprehensive reference for those who specify, manufacture, design or evaluate cast metal components.

This broad-based collection of applied casting knowledge provides a valuable resource for students, educators, practicing engineers and technical support staff. The revised Volume 15 updates and expands coverage on the principles and practices of casting in several ways. Melt processing methods and equipment are described for iron, steel and aluminum in terms of fluxing, degassing, molten metal filtration, refinement and modification. Solidification, process modeling, and filling and feeding concepts are updated to reflect the continuing improvements in casting methods and processing. The major methods of green-sand, no-bake and shell molding are described further in individual articles. Additional articles are devoted to the foundry practice of cast irons, steels, aluminum, copper alloys and zinc. Expert updates are also provided on many other significant casting methods, such as high-pressure die casting, lost-foam, squeeze casting, semi-solid casting, spray casting, rapid solidification and low-pressure die casting of high-integrity product.

ISBN: 978-0-87170-711-6
 2009, Casebound — PB-ASM-018
 Member PriceUS\$219
 Non-Member PriceUS\$289

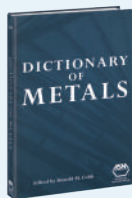


Advanced High-Strength Steels: Science, Technology and Applications

Mahmoud Y. Demeri

Advanced high-strength steels (AHSS) are the fastest-growing material in today's automotive industry and are designed to leverage steel as the optimum automotive material. This book provides a comprehensive account of the structure-property relationship in AHSS. It examines the types, microstructures and attributes of AHSS. It also reviews the current and future applications, the benefits, trends, and environmental and sustainability issues. A compelling feature of the book is its extensive use of property charts and microstructures to simplify visualization of the resulting attributes of AHSS. This book is intended to be a textbook/reference.

ISBN: 978-1-62708-005-7
 2013, Casebound — PB-ASM-025
 Member Price \$119
 Non-Member Price \$159



Dictionary of Metals

Harold M. Cobb, editor

The *Dictionary of Metals* is the authoritative reference work for terms and definitions of metals and terms relating to metals. It also includes a considerable amount of history, starting with the seven metals of antiquity. Each of the metallic elements has a discussion that includes the discoverer and date, the naming of the metal and its meaning, the major applications, the significance of the discovery, and physical properties. Includes a timeline of important events in the history of metals and metallurgy.

ISBN: 978-1-61503-978-4
 2012, Casebound — PB-ASM-024
 Member Price US\$109
 Non-Member Price US\$149



Metallurgy for the Non-Metallurgist, 2nd Edition

Arthur C. Reardon, editor

The completely revised second edition of *Metallurgy for the Non-Metallurgist* provides a solid understanding of the

basic principles and current practices of metallurgy. The new edition has been extensively updated with broader coverage of topics, new and improved illustrations, and more explanation of basic concepts. It is a “must-have” ready reference on metallurgy!

ISBN: 978-1-61503-821-3
 2011, Casebound — PB-ASM-023
 Member Price US\$129
 Non-Member Price US\$169



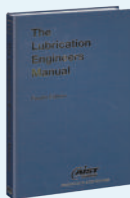
Fundamentals of Steel Product Physical Metallurgy

Now available as a softbound book, *Fundamentals of Steel Product Physical Metallurgy* is an introduction to steel products for industry professionals.

With its readily accessible style, the book allows the reader to easily grasp important scientific topics that play an essential role in current steel research, product development and applications. Written by internationally recognized steel experts with extensive industry experience, the book merges steel physical metallurgy concepts and principles of state-of-the-art technologies. *Fundamentals of Steel Product Physical Metallurgy* was written to address a need for a modern introduction to current steel products. This publication was made possible through the FeMET Curriculum Development Program.

ISBN: 978-1-935117-30-8
 2012, Softbound — PB-401
 Member Price US\$50
 Non-Member Price US\$75

ISBN: 978-1-935117-16-2
 2011, Casebound — PB-400
 Member Price US\$110
 Non-Member Price US\$150



Lubrication Engineers Manual, 4th Edition

The fourth edition of the *Lubrication Engineers Manual* provides updated editorial content to include new and changed technologies and procedures in a reference manual and practical hand-

book for steel industry lubrication theory and practice. The updated handbook covers topics such as fundamental concepts, additives, bearing and seal technology, lubrication systems, plant lubrication programs, used oil, testing performance methods, gears (including new color photographs) and an additional section on filtration.

ISBN: 978-1-935117-05-6
 2010, Casebound — PB-236
 Member Price US\$195
 Non-Member Price US\$275



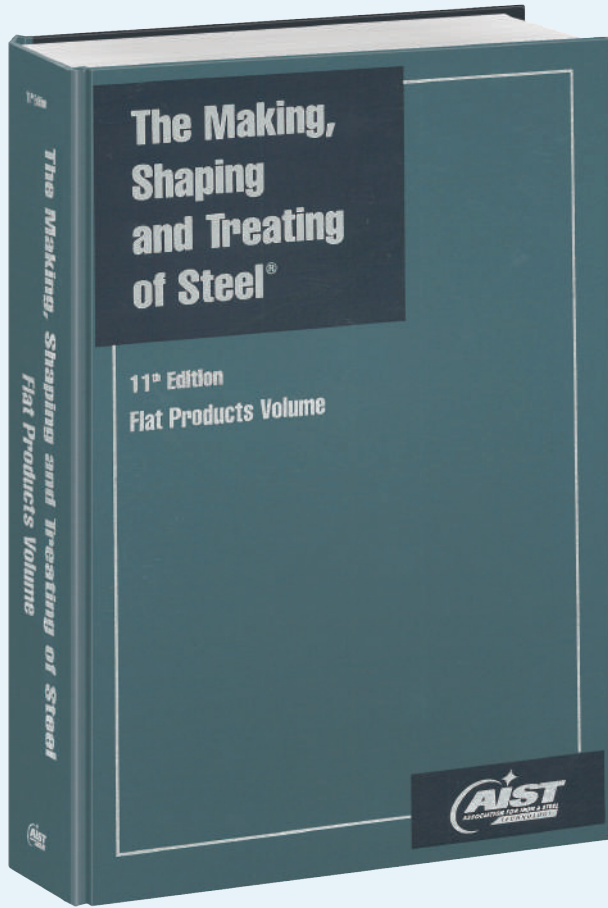
Arc Furnace Physics

Ben Bowman and Klaus Kruger

While it may seem strange to find a book devoted to the physics of an industrial process, the scope for applying physics to arc furnaces is wide. Various states of matter

are involved — the plasma of the arc itself, steel and refractories in the solid state, steel as liquid, slag as an ionic liquid, and the gases and fumes involved with the furnace. Most of the engineers and managers who are responsible for arc furnaces do not have the opportunity or time to study all the widely dispersed, previously published information on arc furnaces. The authors’ intention is that *Arc Furnace Physics* will supply useful information needed in the continual quest to extract improved performance from the arc furnace. The result is a comprehensive encyclopedia of a technology which still holds much development potential to be tapped.

ISBN: 978-3-514-00768-0
 2009, Casebound — PB-VDEH-028
 Member Price US\$115
 Non-Member Price US\$150



The Making, Shaping and Treating of Steel®, 11th Edition, Flat Products Volume♦

Dr. Vladimir B. Ginzburg

The Making, Shaping and Treating of Steel®, 11th edition, *Flat Products Volume* outlines the progress made during the last 25 years in the major areas of scientific and technical know-how required for production of high-quality flat products. *The Flat Products Volume* is a compilation of international knowledge in four major areas:

- Properties, metallurgical design and applications of flat products.
- Rolling theory and metallurgical aspects of the flat rolling process.
- Designs and performance characteristics of various plants producing flat products and descriptions of the plants' principal components.
- Automation and process control equipment providing desired characteristics of geometrical, mechanical and metallurgical parameters of produced flat products.

ISBN: 978-1-935117-36-0

2014, Casebound — PB-437

Member Price US\$100

Non-Member Price US\$125

2014, CD-ROM — PB-438

Member Price US\$100

Non-Member Price US\$125

2014, Casebound w/CD-ROM — PB-438EPKG

Member Price US\$150

Non-Member Price US\$200



The Making, Shaping and Treating of Steel®, 11th Edition, Ironmaking Volume♦

David H. Wakelin, editor

This volume commences with a description of the history of ironmaking and covers the full spectrum of the process. The expanded text focuses on the latest equipment, concluding with an in-depth review of alternative ironmaking processes. Sections include the fundamentals of iron and steelmaking; refractories; coal and coke production; iron ores; blast furnace design and operation; and direct smelting processes. Updated fundamental concepts are balanced with useful rules of thumb.

- ISBN: 978-0-930767-03-7
- 1999, Casebound — PB-334
- Member Price US\$100
- Non-Member Price US\$125
- 1999, CD-ROM — PB-335
- Member Price US\$100
- Non-Member Price US\$125
- 1999, Casebound w/CD-ROM — PB-335EPKG
- Member Price US\$150
- Non-Member Price US\$200



The Making, Shaping and Treating of Steel®, 11th Edition, Casting Volume♦

Alan Cramb, editor

This volume contains a comprehensive treatment of continuous casting, including all aspects of billet, bloom, beam blank, and thin and thick slab casting. Emphasis is placed on the fundamental metallurgical issues that govern proper machine design and operation. Significant attention is also given to operational practices that can lead to defect formations; the interrelationship between steelmaking, casting and rolling; grade and alloying element effects on casting; the importance of maintenance; design of various casters; and future casting processes.

- ISBN: 978-0-930767-04-4
- 2010, Casebound — PB-436
- Member Price US\$100
- Non-Member Price US\$125
- 2003, CD-ROM — PB-336
- Member Price US\$100
- Non-Member Price US\$125
- 2003, 2010, Casebound w/CD-ROM — PB-336EPKG
- Member Price US\$150
- Non-Member Price US\$200



The Making, Shaping and Treating of Steel®, 11th Edition, Steelmaking and Refining Volume♦

Richard J. Fruehan, editor

The *Steelmaking and Refining Volume of The Making, Shaping and Treating of Steel®* emphasizes the important developments that have contributed to improvements in steelmaking quality and productivity in recent decades. The history and development of the various technologies are fully discussed. The technical detail is written at a level that will benefit the expert, but in such a way that someone new to the business can understand the concepts without being overwhelmed. Chapters on EAF steelmaking and ladle and secondary refining have been greatly expanded from the 10th edition. The chapters on BOF and AOD steelmaking were also updated to reflect current understanding.

- ISBN: 978-0-930767-02-0
- 1998, Casebound — PB-332
- Member Price US\$100
- Non-Member Price US\$125
- 1998, CD-ROM — PB-333
- Member Price US\$100
- Non-Member Price US\$125
- 1998, Casebound w/CD-ROM — PB-333EPKG
- Member Price US\$150
- Non-Member Price US\$200



The Making, Shaping and Treating of Steel®, 10th Edition CD-ROM

William T. Lankford Jr., editor

The 10th edition of *The Making, Shaping and Treating of Steel®*, now available on CD-ROM, includes comprehensive data on continuous casting, ladle metallurgy, direct reduction, electric furnace operation, electrogalvanizing, refractories and much more. The role of the computer in modern steelmaking is discussed in the chapters dealing with the rolling of steel. Fuel efficiency is addressed in the chapters on steel plant fuels and fuel economy and heating steel for hot working. Originally published in 1985.

- ISBN: 978-0-930767-00-6
- 2008, CD-ROM — PB-431
- Member Price US\$100
- Non-Member Price US\$125



Capital Investment Costs for Plant and Equipment in Iron and Steelmaking

Metals Consulting International Ltd.

This study identifies the per-metric-ton investment costs and typical capacities for each main process step in iron- and steelmaking. The report also discusses reasons for capital cost variability and contains an outline of recent investment geography. Commentary is included on contractual issues (regional differences), on the employment impact of investment and on facility design trends. Published in December 2010, this report will be of interest to steel plant owners, investors, managers and corporate strategic planning departments. The authors' capital cost graphs include ~30 CAPEX cost vs. capacity charts for sinter, coke, DRI, blast furnaces, BOF plants, EAFs, induction furnaces, slab casting, billet and bloom casting, plate, hot rolled coil, cold rolled coil, hot-dip galvanized sheet, tinplate, organic coated sheet, heavy sections, steel bar, wire rod, drawn wire, welded tube, seamless tube, pellets, washed coal, lime, PCI, air separation, power plants, etc.

Please note: This is a PDF document, available for download upon purchase at Bookstore.AIST.org.

2010, PDF — PR-MCI-001
 Member Price US\$2,250
 Non-Member Price US\$2,500



Condition Monitoring Standards, Volumes I-IV

Condition Monitoring Standards (CMS) are the building blocks of a documentation system created by IDCON for setting up and running a preventive maintenance, essential care

and condition monitoring (PM/ECCM) system in any industry. Each CMS has been carefully compiled by IDCON together with master craftspeople, supervisors and operators from many plants.

Volume I
 2008, Softbound — PB-IDCON-005
 Member Price US\$175.50
 Non-Member Price US\$195

Volume II
 2008, Softbound — PB-IDCON-006
 Member Price US\$175.50
 Non-Member Price US\$195

Volume III
 2008, Softbound — PB-IDCON-007
 Member Price US\$175.50
 Non-Member Price US\$195

Volume IV (pictured)
 2009, Softbound — PB-IDCON-008
 Member Price US\$175.50
 Non-Member Price US\$195



Reliability Based Spare Parts and Materials Management

Don Armstrong

This 50-page book provides real solutions to maintenance storeroom management problems. Management teams from the maintenance storeroom, purchasing and IT departments should read this powerful and practical book. Readers will take away tools and knowledge to dramatically improve spare parts and materials management.

2008, Softbound — PB-IDCON-004
 Member Price US\$40.50
 Non-Member Price US\$45



Maintenance Planning and Scheduling

Don Armstrong

Maintenance Planning and Scheduling is a definitive authority on the subject and provides practical, tested techniques and processes by which

one can build, run and manage this function to world-class standards. Written by IDCON, the book incorporates more than 110 years of cumulative maintenance management experience. Topics covered in the 11 sections include: maintenance fundamentals, planning systems, work order planning, backlog management, maintenance scheduling, computerized maintenance management systems development, planning and scheduling shutdowns, performance measurements and management, essential care, and condition monitoring.

2008, Softbound — PB-IDCON-002
 Member Price US\$130.50
 Non-Member Price US\$145



Results Oriented Reliability and Maintenance Management

Christer Idhammar

Results Oriented Reliability and Maintenance Management is an inspiring source of

knowledge in reliability and maintenance management, leadership, execution and practical tips. This maintenance management book is comprised of independent reliability and maintenance articles on a wide variety of subjects. It affords the reader ingenious insights and solutions to everyday maintenance management problems. Topics covered include productivity, competitiveness, failure analysis, teamwork, organizational structures, key performance indicators, benchmarking, reliability-centered maintenance, implementation of world-class reliability and maintenance practices, the new role of the supervisor, cost-cutting, flexibility, multi-craft, preventive maintenance inspection intervals, and many more topics.

2008, Softbound — PB-IDCON-003
 Member Price US\$85.50
 Non-Member Price US\$95

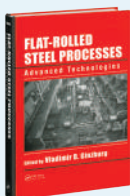


Preventive Maintenance/ Essential Care and Condition Monitoring

This preventive maintenance book is a “must have” for all maintenance professionals.

It is a unique resource for improving maintenance management processes and learning smart preventive maintenance (PM), condition monitoring, inspection and troubleshooting techniques on a wide variety of components, including pumps, motors, gears, bearings, chain, pipes and valves, couplings, seals, fans, lubrications, lifting equipment, hydraulics, pneumatics, compressors, steam, electrical systems, etc. The condition monitoring and PM techniques are presented in the book, together with inspection tools and examples of how to inspect and prevent failures for a number of standard components. This book carefully explains how to set up and improve a preventive maintenance program in any industry.

1998, Softbound — PB-IDCON-001
Member Price US\$112.50
Non-Member Price US\$125



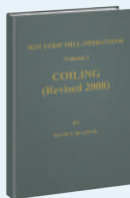
Flat-Rolled Steel Processes: Advanced Technologies

Vladimir B. Ginzburg

Considered one of the major innovators in the flat rolling of steel, Vladimir B. Ginzburg holds more than

two dozen patents in the industry. In this volume, Ginzburg brings together other industry pioneers to define the latest developments in flat rolled processes. This includes the revolutionary introduction of computer-based technology in both new and existing conventional rolling mills. Each section provides a brief topic summary and then goes on to describe the latest advances specific to that area. Main subjects include advanced hot rolling mills, advanced cold rolling mills, control systems and the production of advanced flat rolled steel products.

ISBN: 978-1-4200-7292-1
2009, Casebound — PB-251
Member Price US\$152.95
Non-Member Price US\$169.95



Coiling: Hot Strip Mill Operations, Vol. I

David T. Blazevic

The completely revised first volume of the *Hot Strip Mill Operations* series has three main objectives: to reconfigure the original book to

explain coiling principles, to provide an update in some new variations for coiling, and finally, to change the concept in understanding the physics of coiling. In addition to the changes in text, *Coiling* now features color illustrations and photographs.

2008, Casebound — PB-HRC-001
Member Price US\$300
Non-Member Price US\$350



REVISED! Roll Cooling, Rolling Problems and Shape: Hot Strip Mill Operations, Vol. II

David T. Blazevic

The second volume of *Hot Strip Mill Operations* is aimed

at one primary objective: roll cooling is for shape and has little to do with roll wear. The demands of operators, roll manufacturers, and mill builders for low roll wear, prevention of roll breakage, good shape, minimizing fire cracking and surface appearance are all inclusive in roll cooling on a hot strip mill.

2013, Casebound — PB-HRC-002
Member Price US\$200
Non-Member Price US\$300



Roll Wear, Broken Rolls and Roll Life: Hot Strip Mill Operations, Vol. III

David T. Blazevic

The third volume of *Hot Strip Mill Operations* looks at the basic causes of roll wear to

guide operators away from roll cooling myths of pressure, volume or impact angles helping to reduce roll wear. Continuing the theme of the second volume (*Roll Cooling, Rolling Problems and Shape*) that roll cooling has little to do with roll wear, the third volume’s additional objective is the understanding of roll wear.

2001, Casebound — PB-HRC-003
Member Price US\$200
Non-Member Price US\$225



Build Up or Ridges: Hot Strip Mill Operations, Vol. IV

David T. Blazevic

In this fourth volume of *Hot Strip Mill Operations*, the primary objectives of *Build Up or Ridges* are to separate localized

shape distortions, such as buildup, from general shape problems, and to explain how buildup goes through the hot strip and cold strip mills. This book shows that the basic causes of buildup are uneven roll cooling and roll heating, giving operators the opportunity to concentrate their efforts in the right direction to control shape distortions.

2002, Casebound — PB-HRC-004
 Member Price US\$175
 Non-Member Price US\$200



Scale: Hot Strip Mill Operations, Vol. V

David T. Blazevic

Scale, the fifth volume of *Hot Strip Mill Operations*, has two main objectives: understanding of scale formation and scale growth, and developing

empirical scale growth formulas. The book examines the nature of the quality problems caused by scale, and includes trial calculations for furnace scale, secondary scale and tertiary scale.

2005, Casebound — PB-HRC-005
 Member Price US\$225
 Non-Member Price US\$250



Descaling: Hot Strip Mill Operations, Vol. VI

David T. Blazevic

Descaling, Volume VI of *Hot Strip Mill Operations*, centers on the explanation of the variations of descaling and descaling

systems, understanding descaling forces and the principles of descaling designs. This will allow operators to concentrate their efforts in relation to scale growth control, eliminate rolled-in scale, and further enhance the surface quality produced on hot strip and plate mills.

2008, Casebound — PB-HRC-006
 Member Price US\$300
 Non-Member Price US\$350



Rolled In Scale: Hot Strip Mill Operations, Vol. VII

David T. Blazevic

Rolled-in scale is the most interesting problem encountered on hot rolling mills.

This volume has the following objectives: identification of rolled-in scale defects, to quickly identify the potential source of the scale and provide solutions for each type of rolled-in scale. *Rolled In Scale* concentrates on hot strip and plate mill operating practices, but much of the material applies to structural, bar and pipe mills.

2010, Casebound — PB-HRC-007
 Member Price US\$300
 Non-Member Price US\$350



Reheat Furnace Practices: Hot Strip Mill Operations, Vol. VIII

David T. Blazevic

Reheat Furnace Practices, Volume VIII of the *Hot Strip Mill Operations* series, has

three objectives: separating the furnace engineering and operating practices, defining the functions of the furnace to produce a higher surface quality on plates or coils, and explaining the connection with rolled-in scale. Accomplishing these goals will allow hot mill operators to concentrate their efforts on the critical aspects of reheat furnace practices to eliminate some types of rolled-in scale, reduce scale growth to minimize costs, and enhance the surface and microstructural quality produced on hot strip and plate mills.

2010, Casebound — PB-HRC-008
 Member Price US\$300
 Non-Member Price US\$350



Scale Package: Hot Strip Mill Operations, Volumes V-VII

David T. Blazevic

Buy all three of David T. Blazevic's influential books regarding scale and save US\$100. Set includes one copy each of *Scale*, *Descaling* and *Rolled In Scale*.

2005, 2008, 2010, Casebound — PB-HRC-005EPKG
 Member Price US\$725
 Non-Member Price US\$850



Advanced Safety Management: Focusing on Z10 and Serious Injury Prevention

Fred Manuele

Advanced Safety Management gives the information and

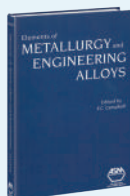
guidance needed to ensure that an organization can implement the ANSI Z10 standard. The book also helps in determining and preparing for the beneficial effects that integrating its provisions can have on productivity, cost-efficiency and quality. Among the key topics discussed are risk assessment methods and prioritization, applying a prescribed hierarchy of controls, implementing and performing safety design reviews, including safety specifications in purchasing and procurement systems, and management of change systems.

ISBN: 978-0-470-10953-3

2008, Casebound — PB-WIL-002

Member Price US\$76.50

Non-Member Price US\$84.95



Elements of Metallurgy and Engineering Alloys

F.C. Campbell

This practical reference provides thorough and systematic coverage of both basic metallurgy and the practical

engineering aspects of metallic material selection and application.

ISBN: 978-0-87170-867-0

2008, Casebound — PB-ASM-017

Member Price US\$109

Non-Member Price US\$149



Melting and Mixing of Alloying Agents in Steel Melts

Liuyi Zhang and Franz Oeters

There is an ever-increasing need for accurate composition of liquid steel as the primary product in steelmaking. This book meets the demand for calculation models that describe the melting and dissolution of alloys and their subsequent mixing in the steel melt.

ISBN: 978-3-514-00637-9

2006, Softbound — PB-VDEH-007

Member Price US\$27.09

Non-Member Price US\$30.10



The Appearance of Cracks and Fractures in Metallic Materials

A revised and extended version of the 1983 edition, *The Appearance of Cracks and Fractures in Metallic Materials* provides a starting point for

more comprehensive coverage in the future of the special aspects of cracks and fractures in non-ferrous metals. Contents include: classification of cracks and fractures, fracture mechanics; appearance of cracks and fractures due to mechanical loading; thermal loading and corrosion; and special features of cracks and fractures. In German and English.

ISBN: 978-3-514-00463-4

2008, Softbound — PB-VDEH-025

Member Price US\$64.85

Non-Member Price US\$89.95



Thin Slab Direct Rolling of Microalloyed Steels

J.M. Rodriguez-Ibabe

Thin-slab casting and direct rolling (TSDR) technologies are currently one of the most promising processing

routes to maintain steel as a leading material in technological applications. Initially, this process was exclusively for the production of mild steels. As industrial experience and knowledge improved, a rapid expansion of the range of products took place, with higher-strength grades becoming an important part of the overall production. It is widely accepted as a route to produce high-value grades, and TSDR can be considered as a technology that has reached a high degree of maturity. This book aims to provide an approach to the different metallurgical aspects involved in the application of thermomechanical treatments in the TSDR route.

ISBN: 978-0-87849-485-9

2008, Softbound — PB-TTP-001

Member Price US\$68

Non-Member Price US\$72



Handbook of Comparative World Steel Standards, 4th Edition

John E. Bringas, editor

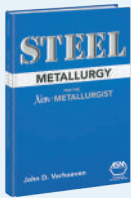
Get a detailed explanation of how and why one steel is comparable to another — no other book currently on the market does this. This edition allows the user to identify comparable steels that are found in standards from around the world, and to evaluate each standard to ensure that the selected steel is suited for the intended application. Compare standards from ASTM, AFNOR, API, ASME, BSI, EN, CSA, DIN, GB, ISO, JIS and SAE.

ISBN: 978-0-8031-6223-5

2007, Softbound — PB-ASTM-011

Member Price US\$382.50

Non-Member Price US\$425



Steel Metallurgy for the Non-Metallurgist

John D. Verhoeven

This book explains the metallurgy of steel and its heat treatment for non-metallurgists. It starts from basic concepts — beginning at the level of high school chemistry — and builds to more complex concepts involved in heat treatment of most types of steel as well as cast iron. This book is the practical primer on steel metallurgy for those who heat, forge or machine steel.

ISBN: 978-0-87170-858-8
 2007, Casebound — PB-ASM-016
 Member Price US\$69
 Non-Member Price US\$99



Welding Technology for Engineers

Baldev Raj, V. Shankar and A.K. Bhaduri, editors

Welding Technology for Engineers deals with three major areas of welding technology — welding metallurgy, welding process technology and welding quality assurance. Coverage of welding metallurgy includes comprehensive information about weldability of metals and alloys in common industrial use, including steels, stainless steels, aluminum, titanium, nickel and copper alloys. The fundamentals and latest advances in welding process technology, and welding qualifications and quality control measures required for quality assurance are also discussed. The book provides examples of advanced non-destructive techniques illustrating solutions to difficult inspection problems, including innovative techniques. The volume also addresses specialized topics such as welding design, control of residual stresses and distortion, mechanical testing of weldments, and corrosion behavior.

ISBN: 978-0-87170-831-1
 2006, Casebound — PB-ASM-021
 Member Price US\$69
 Non-Member Price US\$99

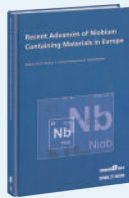


Handbook of the European Iron and Steel Works

In German and English. The *Handbook* provides a wealth of information in the form of national statistics on production, as well as import and

export of steel products and raw materials. A comprehensive product index facilitates the product-specific search of manufacturers.

ISBN: 978-3-875521-66-5
 2005, Casebound w/CD-ROM — PB-VDEH-003
 Member Price US\$235.20
 Non-Member Price US\$275



Recent Advances of Niobium-Containing Materials in Europe

K. Hulka, C. Klinckenberg and H. Mohrbacher, editors

Proceedings of the symposium held at the occasion of the 30-year anniversary of the Niobium Products Co. GmbH in Düsseldorf, Germany.

ISBN: 978-3-514-00724-6
 2005, Casebound — PB-VDEH-022
 Member Price US\$134.40
 Non-Member Price US\$162



Continuous Casting, Vol. 10: Tundish Operations

The tundish represents the inextricable link between batch steelmaking and the continuous casting process. In its initial stages of develop-

ment, the tundish was regarded as nothing more than a reservoir to hold sufficient liquid steel to provide a constant head over the mold, and to permit a ladle exchange to occur without interruption of sequence casting. It is not possible to provide discussion on tundish operations that encompasses all tundish metallurgy issues. *Continuous Casting, Vol. 10* provides a road map to tundish technologies for steelmakers of varying levels of expertise.

ISBN: 978-1-886362-70-3
 2004, Casebound — PB-099
 Member Price US\$50
 Non-Member Price US\$70



Atlas of Precipitates in Steels CD-ROM

The *Atlas of Precipitates in Steels*, compiled by the Steel Institute VDEh's Working

Group on Electron Microscopy of Materials, facilitates access to existing literature concerning precipitation processes in steels. The concise descriptions and illustrations enable the reader to find important information regarding the precipitates and their effects occurring in certain steels and steel groups.

ISBN: 978-3-514-00681-2
 2003, CD-ROM — PB-VDEH-021
 Member Price US\$168
 Non-Member Price US\$208



Austenite Formation and Decomposition

E. Buddy Damm and Matthew Merwin, editors

These papers were presented at a symposium sponsored by the ISS Product Physical Metallurgy and TMS Phase

Transformation committees. Academic and industrial experts in austenite formation and decomposition present the field's latest developments, covering such areas as advancements in the understanding of the mechanistic, diffusional and thermodynamic aspects of austenite formation and decomposition, as well as the ability to measure, characterize and model these phenomena.

ISBN: 978-0-873395-59-5

2003, Casebound w/CD-ROM — PB-126

Member Price US\$75

Non-Member Price US\$100



Catalogue of Ingot Defects

For ingot processing by rolling and forging, it is essential that the ingot surface is free from defects and that the interior ingot structure complies with the requirements of the intended use. This applies to

conventional casting methods as well as special melting methods. The bilingual German-English catalog is subdivided into ingot surface defects, ingot head defects, interior ingot defects and defects occurring during ESR.

ISBN: 978-3-514-00692-8

2003, Softbound — PB-VDEH-010

Member Price US\$74.34

Non-Member Price US\$82.60



Innovation and Excellence in Continuous Casting

Heinrich Marti, editor

This book presents the state of the art in continuous casting. It is a collection of papers providing an impres-

sive overview, including the latest developments such as strip casting. International leaders in the field demonstrate the scientific, technical and operational excellence that underpins both continuous improvement and major innovation in the technology.

ISBN: 978-3-514-00693-8

2003, Casebound — PB-VDEH-005

Member Price US\$138.60

Non-Member Price US\$166



Innovation and Excellence in Continuous Casting CD-ROM

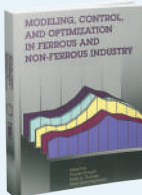
Heinrich Marti, editor

This CD-ROM includes the history of continuous casting; technical one-pagers, publications and courses on continuous casting; and the thesis and dissertation of Dr. Manfred Wolf regarding this topic.

2003, CD-ROM — PB-VDEH-006

Member Price US\$840

Non-Member Price US\$940



Modeling, Control, and Optimization in Ferrous and Non-Ferrous Industry

F. Kongoli, B.G. Thomas and K. Sawamiphakdi, editors

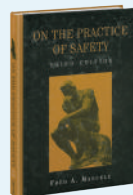
These proceedings contain papers from a symposium organized to discuss technological developments in process control and optimization in the field of extraction and processing of metals and materials, both in ferrous and non-ferrous industries.

ISBN: 978-0-873395-61-8

2003, Softbound — PB-127

Member Price US\$87

Non-Member Price US\$123



On the Practice of Safety, 3rd Edition

Fred Manuele

The completely revised and updated third edition of the benchmark *On the Practice of Safety* thoroughly covers subjects that must be mastered

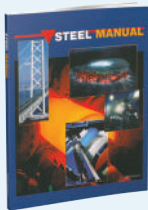
by anyone seeking to attain professional status in the practice of safety. Like its predecessors, the third edition provides a solid foundation for the study of the practice of safety in degree programs. Additionally, it serves as a basis for self-analysis by those who seek to improve their performance, gain recognition from management for providing value and achieve professional status.

ISBN: 978-0-471-27275-5

2003, Casebound — PB-WIL-001

Member Price US\$101.25

Non-Member Price US\$112.50

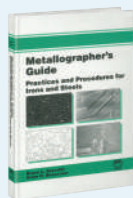


Steel Manual

This book has been used as a valuable training manual for several decades. Non-experts in the industry and trade wishing to acquire some general knowledge about steel and its production and processing routes will find this

book a useful, easy-to-understand introductory work. The current edition has been completely revised, including for the first time the topic of plant management.

ISBN: 978-3-514-00686-7
 2003, Softbound — PB-VDEH-024
 Member Price US\$27.72
 Non-Member Price US\$36



Metallographer's Guide: Practices and Procedures for Irons and Steels

B.L. Bramfitt and A.O. Benschoter

This book provides a solid overview of the important metallurgical concepts related to the microstructures of iron and steel, and provides guidelines for the proper metallographic techniques used to reveal, capture and understand microstructures, as well as instructions for equipment selection and use, microscopy techniques, specimen preparation and etching. The book features 500 representative microstructures with index.

ISBN: 978-0-87170-748-2
 2002, Casebound — PB-ASM-001
 Member Price US\$129
 Non-Member Price US\$169

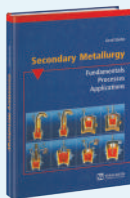


Rolls for the Metalworking Industries

G.E. Lee, editor

One price for the book and CD-ROM together! This comprehensive work is the definitive book on roll technology. Sections include: principles of roll metallurgy; roll manufacturing processes; principles of the rolling process; applications and performance; reclamation and repair; processing rolls; and inspection and user preparation.

ISBN: 978-1-886362-61-1
 2002, Casebound w/CD-ROM — PB-084
 Member Price US\$95
 Non-Member Price US\$125



Secondary Metallurgy: Fundamentals, Processes, Applications

Gerd Stolte

This book is made for engineers who build plants, metallurgists who operate them, as well as researchers. The presentation is based mainly on treatment practices and results obtained during the last decade of the 20th century. Contents include: a description and results of secondary metallurgical processes, cleanliness of steel and slag management, influence of ladle refractory on the melt, continuous casting and cleanliness, environmental considerations, ecological balances and automation systems.

ISBN: 978-3-514-00648-5
 2002, Casebound — PB-VDEH-008
 Member Price US\$124.74
 Non-Member Price US\$138.60



Engineers' Guide to Technical Writing

Kenneth G. Budinski

The ability to write clearly is essential for career advancement in any technical field. This book provides guidelines, methods and rules to make you a more effective technical writer. Includes checklists and step-by-step techniques.

ISBN: 978-0-87170-693-5
 2001, Casebound — PB-ASM-004
 Member Price US\$39
 Non-Member Price US\$49



Surface Defects on Electrolytically Coated Steel Sheet

Available in four languages: German, English, French and Spanish. Content includes: coating defects, defects of zinc-coated starting material, post-treatment and general defects.

ISBN: 978-3-514-00640-9
 2000, Softbound — PB-VDEH-013
 Member Price US\$47.88
 Non-Member Price US\$53.20



Surface Defects on Cold Rolled, Uncoated Sheet

Available in four languages: German, English, French and Spanish. Thirty-two defects are covered, including: shell, rokes/seams, blowholes, scale

pits/scabs, scale residues, hot strip scratches and orange peel.

ISBN: 978-3-514-00583-9

1996, Softbound — PB-VDEH-012

Member Price US\$37.80

Non-Member Price US\$42



Surface Defects in Hot Rolled Flat Steel Products

Available in four languages: German, English, French and Spanish. This book covers surface defects such as blowholes, shell, fissures, holes,

dross and other inclusions, mechanical damages, edge defects and other defects. A keyword index is included.

ISBN: 978-3-514-00590-7

1996, Softbound — PB-VDEH-011

Member Price US\$36.54

Non-Member Price US\$40.60



Surface Defects on Hot-Dip Metal Coated Steel Sheet

Available in four languages: German, English, French and Spanish. Content includes: defect nomenclature with brief definitions; shell; rokes/

seams; blowholes, holes, scale defects, starting material scratches; rust and coolant stain; cold rolling marks; transverse undulations/chatter marks; ridges; serrated edge; orange peel; furnace roll pimples; flakes of scale; dross; uncoated areas; coating ripple; ribs; edge overgrowth; scintillation; nozzle streaks; nozzle smears; edge particles; metal splashes; chevrons; FeZn layer; lack of alloying penetration; bath roller marks; speckling; contact marks; roller imprints; coil breaks; feathering; pinch marks/folds/stripes; chromating defects and others.

ISBN: 978-3-514-00620-1

1998, Softbound — PB-VDEH-014

Member Price US\$47.88

Non-Member Price US\$53.20



Faults in Hot-Dip Galvanizing

Available in three languages: German, English and French. Thirty-three faults are covered, including: defect-free zinc coatings, cracks in the material to be galvanized, metal embrittlement, distortion,

network cracks in zinc coatings and blisters in the zinc coating.

ISBN: 978-3-514-00298-2

1983, Softbound — PB-VDEH-015

Member Price US\$41.58

Non-Member Price US\$46.20



Direct Reduced Iron

J.R. Fineman and D.R. MacRae, editors

Advancements in technology are reflected in chapters on thermodynamics and reaction kinetics, process technologies, economics and use in iron and steelmaking. Additional

topics include process computer simulation and analysis, and the promise of smelting technology. The authors' contributions provide thorough coverage of theoretical and practical aspects for practicing operators, engineers, managers and students in engineering, economics and business.

ISBN: 978-1-886362-31-4

2000, Softbound — PB-320

Member Price US\$84

Non-Member Price US\$120



Understanding How Components Fail, 2nd Edition

Donald J. Wulpi

In this book, basic principles and practices are clearly explained, with numerous examples featuring commonly

used metals, parts and service environments. The updated second edition provides expanded coverage of many important failure analysis concepts and analytical techniques.

ISBN: 978-0-87170-631-7

1999, Casebound — PB-ASM-007

Member Price US\$129

Non-Member Price US\$169



**Metals Handbook
Desk Edition,
2nd Edition**

J.R. Davis

The *Metals Handbook Desk Edition* is a comprehensive, accessible, convenient and practical reference source on the properties, selection, processing, testing and characterization of metals and their alloys. It represents the best of the 20-plus-volume ASM handbook series in a single, well-organized volume. The coverage and presentation are highly practical and assume minimal prior knowledge.

ISBN: 978-0-87170-654-6
1998, Casebound — PB-ASM-015
Member Price US\$225
Non-Member Price US\$299



**Surface Engineering
for Corrosion and
Wear Resistance**

J.R. Davis, editor

This book provides practical information to help select the best possible surface treatment. An entire chapter is devoted to process comparisons, and dozens of useful tables and figures compare surface treatment thickness and hardness ranges; abrasion and corrosion resistance; processing time; temperature and pressure; costs; distortion tendencies; and other critical process factors and coating characteristics.

ISBN: 978-0-87170-700-0
2001, Casebound — PB-ASM-006
Member Price US\$69
Non-Member Price US\$99



Slag Atlas

In iron- and steelmaking, as well as in non-ferrous metal production and other refining technologies, the use of slag is of essential importance. The refining reactions are controlled by metal/slag systems, and nearly all processes are closely related to the use of metallurgically effective slag. Knowledge of the properties of the slag used in iron and steel production is needed to enable assessment of various reactions and optimal process control. The results of a research project were prepared in the second edition in order to adequately diffuse information to production, research and educational establishments.

ISBN: 978-3-514-00457-3
1995, Casebound — PB-VDEH-009
Member Price US\$226.80
Non-Member Price US\$252



**ASM Materials
Engineering
Dictionary**

J.R. Davis, editor

This comprehensive materials dictionary features 10,000 authoritative entries (arranged alphabetically), covering materials, processes and concepts related to ferrous and non-ferrous metals, plastics, ceramics, composites and adhesives.

ISBN: 978-0-87170-447-4
1992, Casebound — PB-ASM-009
Member Price US\$69
Non-Member Price US\$99



Chemistry of American Standard Steels

Harold M. Cobb, editor
Chemistry of American Standard Steels is the latest in AIST's Steel Pocketbook series. This handy guide

reflects the rapid pace of alloy development in some parts of the steel industry over the past decade. Extensive revisions have been made to the *Pocketbook of Standard Wrought Steels*, formerly published by the Iron & Steel Society. Recent ASTM chemistry data on various steel products is provided in the many tables, including:

- Bars, Sheet and Strip
- Structural Steels
- Mechanical, Welded and Seamless Tubing
- Miscellaneous Steels and Iron-Base Alloys — including common chrome-moly grades
- Stainless Steels — with 43 additional alloys!
- Tool and Valve Steels

ISBN: 978-1-935117-15-5
 2012, Softbound — PB-233
 Member Price US\$25
 Non-Member Price US\$35

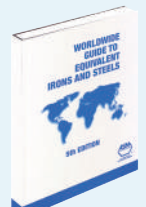


Bar Steels: Steel Products Manual

The revised *Bar Steels: Steel Products Manual* provides concise information pertaining to the manufacturing processes, product characteristics and uses of bar steel. Updated under the supervision of the AISI Bar

Applications Group, *Bar Steels* contains current North American bar product manufacturing practices and related technical information. The revision includes an expanded section on the production of hot rolled steel bar products and a new section on the selection of bar products for an application.

ISBN: 978-1-935117-12-4
 2010, Softbound — PB-210
 Member Price US\$40
 Non-Member Price US\$75



Worldwide Guide to Equivalent Irons and Steels, 5th Edition

This volume covers standard designations from worldwide standards for cast irons and steels, wrought carbon and alloy steels, stainless steels,

high-strength steels and tool steels. The fifth edition features expanded coverage for specifications and designations from Japan, China, India and South Korea.

ISBN: 978-0-87170-822-9
 2006, Casebound — PB-ASM-013
 Member Price US\$225
 Non-Member Price US\$299



Stainless Steels: A Steel Products Manual

Harold M. Cobb, editor
 This greatly expanded 2008 edition of *Stainless Steels: A Steel Products Manual* is an invaluable source of informa-

tion for those who work with stainless steels — engineers, metallurgists, designers, architects and others involved with buying and selling, specifying or using stainless steel. This 336-page book includes highly useful information not readily found in other publications. Content includes the Stainless Steel Alloy Index, an overview of stainless steels, data sheets, product forms and more, plus the new Naming and Numbering of Stainless Steels. Reviewers have claimed *Stainless Steels* to be the “quickest, easiest-to-use stainless reference.”

ISBN: 978-1-886362-98-7
 2008, Casebound — PB-229
 Member Price US\$100
 Non-Member Price US\$140



Steel Sheet: Steel Products Manual

Harold M. Cobb, editor
 The revised edition of the *Steel Sheet Manual* includes descriptions of 31 steel sheet products and specifications for both

coated and uncoated steel, as well as detailed information concerning the production, metallurgy, properties, dimensional tolerances, and the inspection and testing of these materials. Thirteen ASTM specifications were discontinued in 2000 and 2001 and have been replaced by three new specifications covering hot rolled and cold rolled carbon steel, structural steel and high-strength, low-alloy steel sheet. One of the new specifications covers these products when provided as heavy-thickness coils. Also in this edition, thickness tolerance tables have been revised, 19 photos of the most common steel sheet imperfections are shown, and a new specification is described in the section on coated steel products.

ISBN: 978-1-886362-65-9
 2004, Softbound — PB-228
 Member Price US\$45
 Non-Member Price US\$75



**Tin Mill Products:
Steel Products
Manual**

This manual describes the four types of tin mill products that are commonly produced: electrolytic tinplate (ETP), electrolytic tin coated sheet (ETCS), electrolytic chromium coated steel (ECCS) and black plate (BP). Sections include product designations, manufacturing methods, physical characteristics, coating characteristics and more.

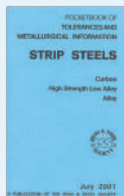
ISBN: 978-1-886362-64-2
2002, Softbound — PB-215
Member Price US\$40
Non-Member Price US\$70



**Tool Steels: Steel
Products Manual**

Tool Steels is an easy-to-use manual providing comprehensive information on composition, properties, selection and typical applications. In addition, descriptions of 17 additional types of tool steel, changes in technical terms, a list of pertinent ASTM standards and a tool steel index are provided.

ISBN: 978-1-886362-41-3
2000, Softbound — PB-220
Member Price US\$40
Non-Member Price US\$70



**Pocketbook of
Tolerances and
Metallurgical
Information — Strip
Steels**

This pocketbook covers such topics as standard steels, chemical ranges and limits; hot rolled carbon strip steel; cold rolled carbon strip steel; cold rolled high-carbon (formerly spring) strip steel; high-strength, low-alloy (HSLA) strip steel; alloy strip steel; plus a list of ASTM specifications for steel strip.

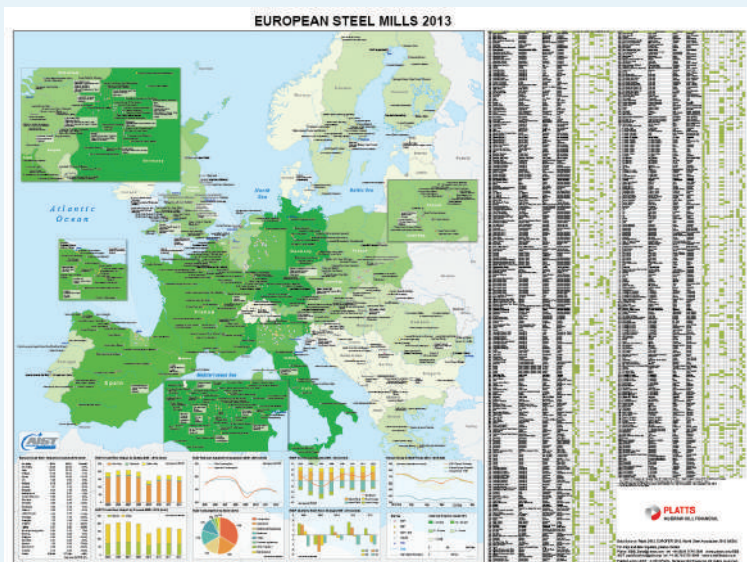
ISBN: 978-1-886362-58-1
2001, Softbound — PB-225
Member Price US\$20
Non-Member Price US\$30



**Plates: Rolled Floor
Plates, Carbon, High
Strength Low Alloy,
and Alloy Steel: Steel
Products Manual**

Revised by the American Iron and Steel Institute Technical Committee on Plates and Shapes, this manual provides easy access to information on standard plates and floor plates, their production, specification requirements, use and applicable tests. Topics include chemical compositions, ranges and tolerances; manufacturing methods and practices; quality descriptions; specifications; test requirements; tolerances for dimension; forming of plates; carbon equivalent; coiled products; variability and more.

ISBN: 978-0-932897-60-2
1997, Softbound — PB-212
Member Price US\$40
Non-Member Price US\$70



2013 European Steel Mills

The Platts European Steel Mills 2013 map gives you the latest overview of Europe's major steel mills and details of what products they produce, as well as key statistics of the region. Its features include steel mill ownership and production methods of 526 mills, major product groups and tonnages, and steel-intensive producing regions.

2013, Laminated, 144 cm (56.7") x 108 cm (42.5") — PB-SBB-160

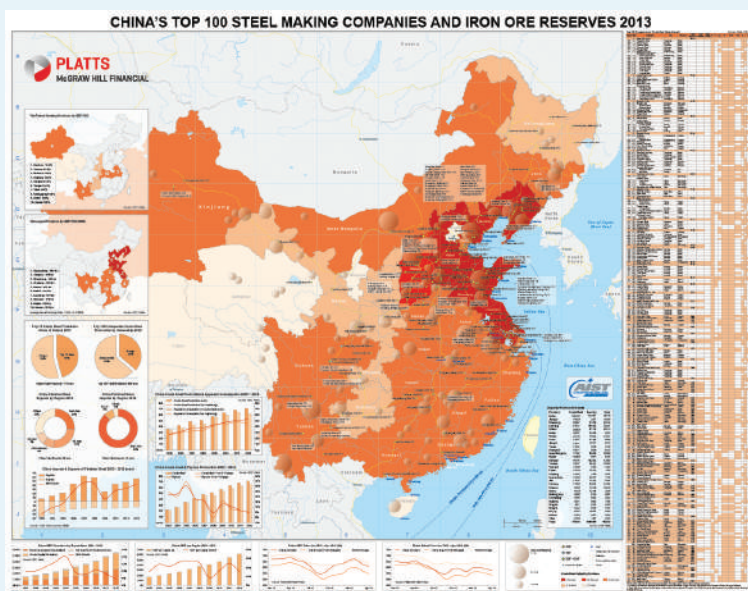
Member Price US\$416

Non-Member Price US\$500

Laminated Map and Excel Data Sheet 2013, Map Package — PB-SBB-161

Member Price US\$560

Non-Member Price US\$700



2013 China's Top 100 Steel Making Companies and Iron Ore Reserves

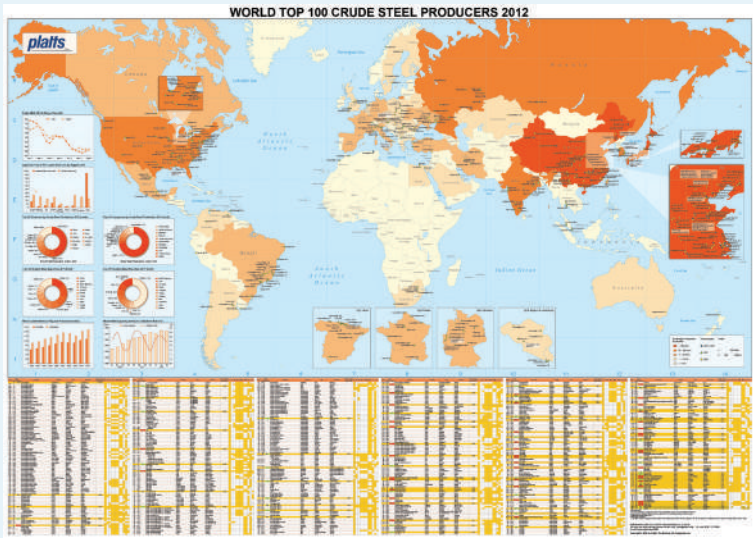
The Platts China Map 2013 gives you the latest overview of China's steelmaking landscape. As well as updating the top 100 list, this new edition includes China's iron ore reserves by size and gives a detailed snapshot of the state of the Chinese steel industry as of the end of 2012. The map also includes the top 10 crude steel producers' share of output in 2012, top 100 companies' crude steel production by ownership in 2012, and monthly price charts of rebar and HRC for January 2012–April 2013.

2013, Laminated, 116 cm (45.7") x 91 cm (35.8") — PB-SBB-158

Member Price US\$399

Non-Member Price US\$499

2012 Map Also Available



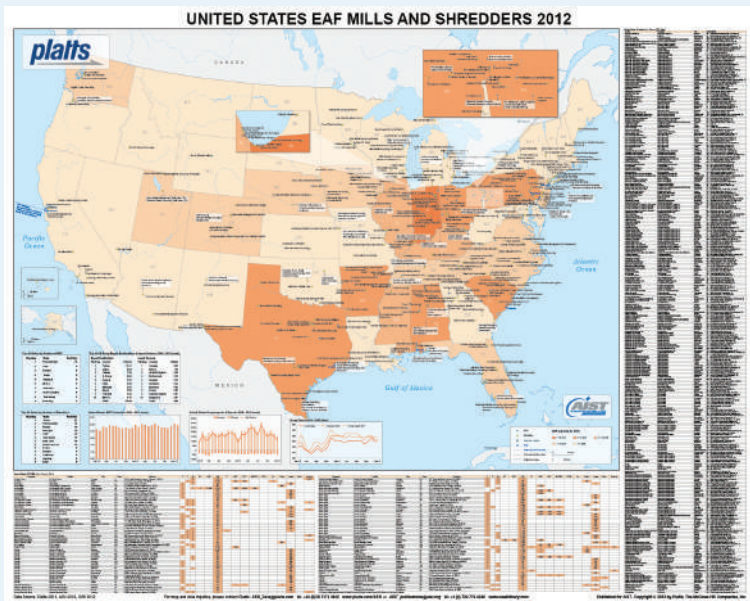
2012 World Top 100 Crude Steel Producers

The updated version of the Top 100 Steel Companies map includes the location of top 102 steel companies in the world and their 446 steelmaking mills, major facilities and products. The map also includes the top 10 countries and companies by steel production, and each company’s crude steel output and product capabilities. The world price of HRC and rebar from June 2011 to December 2012, apparent total steel use and use per capita by region, and world crude steel and pig iron production over the previous 10-year period are also represented.

2012, Laminated, 153 cm (60.2") x 109 cm (43.3") — PB-SBB-157

Member PriceUS\$480

Non-Member PriceUS\$600



2012 U.S. EAF Mills and Shredders

The 2012 U.S. EAF Mills and Shredders map is the first map of its kind, with 97 EAFs, including the facilities’ capacities, products and locations. The map also includes 292 scrap shredders, including their addresses, locations and company owners. Other details include U.S. EAF production data from 2010 to 2012, and U.S. scrap import/export data comparisons. The interactive version includes an Excel data sheet for further research and modeling.

2012, Laminated, 122.5 cm (50") x 98 cm (38") — PB-SBB-153

Member Price US\$360

Non-Member Price US\$450

Interactive Map and Excel Data Sheet
2012, Map Package — PB-SBB-154

Member PriceUS\$759

Non-Member Price US\$999

Other Maps and Atlases

Visit Bookstore.AIST.org for complete information.

	Laminated Map		Map + Excel Data Sheet	
2012 Turkey Iron & Steel Producers and Service Centers	PB-SBB-151	M-\$300 NM-\$400	PB-SBB-152	M-US\$560 NM-US\$700
2011 U.S. Steel Mills and Service Centers	PB-SBB-140	M-\$400 NM-\$500	PB-SBB-144	M-US\$1,199 NM-US\$1,499
2011 Southeastern U.S. Service Centers	PB-SBB-142	M-\$250 NM-\$309	—	—
2011 Western U.S. Service Centers	PB-SBB-143	M-US\$250 NM-US\$309	—	—
2011 Northeastern U.S. Service Centers	PB-SBB-141	M-US\$250 NM-US\$309	—	—
2011 Global Iron & Steel Investments 2001–2015	PB-SBB-146	M-US\$480 NM-US\$600	PB-SBB-147	M-US\$571 NM-US\$839
2011 World Steel and Raw Materials Trade	PB-SBB-148	M-US\$480 NM-US\$600	—	—
2011 World Top Crude Steel Producers	PB-SBB-149	M-US\$480 NM-US\$600	PB-SBB-150	M-US\$640 NM-US\$800
2011 South East Asia, Australia and New Zealand Steel Mills	PB-SBB-135	M-US\$359 NM-US\$449	PB-SBB-136	M-US\$432 NM-US\$549
2011 India's Major Steel Producers and Iron Ore Mines	PB-SBB-137	M-US\$359 NM-US\$449	—	—
2011 World Top 100 Electric Arc Furnace Steel Companies	PB-SBB-133	M-US\$436 NM-US\$545	PB-SBB-134	M-US\$704 NM-US\$880
2010 Japan Iron and Steel Making Plants	PB-SBB-131	M-US\$272 NM-US\$340	—	—
2010 Mexico Steel Mills and Service Centers	PB-SBB-124	M-US\$279 NM-US\$349	—	—
2010 North America Pipe and Tube Mills	PB-SBB-132	M-US\$327 NM-US\$409	PB-SBB-132I <i>Interactive Map & Excel Data Sheet</i>	M-US\$850 NM-US\$999
2010 Russia, Ukraine and Other CIS Iron and Steel Mills	PB-SBB-123	M-US\$292 NM-US\$365	—	—

M = Member • NM = Non-Member

Wall and Interactive Maps





Specification for EOT Cranes for Steel Mill Service♦

Since the issuance of the June 1991 specification, four distinct service classes of cranes are now listed in this specification. This gives the purchaser a method to match the duty cycle of the application without overdesigning the crane and increasing its manufacturing costs. This report is a comprehensive and rational approach to the design and construction of steel mill cranes and other cranes having related or similar usage. The specification is divided into four main sections: general, structural, mechanical and electrical, with relative commentaries and appendices.

ISBN: 978-1886362-82-6
 2005, 3-Ring Binder — TR-06
 Member Price US\$75
 Non-Member Price US\$115



Guide for the Design and Construction of Mill Buildings♦

This updated report guides the owner and designer through the many assumptions and parameters involved in the design of a mill building. It suggests loads and load combinations for the design of crane runways, roof structures, floors, columns, building frames and foundations. Information is given for investigation, earthwork and excavation requirements as in the 1997 edition, as well as revisions to vibration, foundation, soil bearing foundation, crane rails and crane rail splices. In the 2003 edition, all information has been reviewed and updated to the state-of-the-art procedures for design. However, latitude has been provided for even more advanced, proven techniques. All information and direction are within the requirements of national codes and specifications.

2003, Softbound — TR-13
 Member Price US\$75
 Non-Member Price US\$115



Reference Handbook for EOT Cranes — Vol. 1, Mechanical♦

This handbook is a collection of past publications considered useful in the mechanical aspects of electric overhead traveling (EOT) cranes. These articles, dating back to 1952, were previously published in *Iron and Steel Engineer*, a monthly AISE publication. The Mechanical Working Group of Subcommittee No. 6 on Electric Overhead Traveling Cranes for Steel Mill Service hoped readers would benefit from this collection. Revised in 2000.

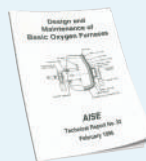
2000, Softbound — PB-340
 Member Price US\$45
 Non-Member Price US\$70



Brake Standards for Mill Motors♦

The current edition of this technical report addresses the entire scope of friction brakes that are spring set, including shoe, caliper disc and motor-mounted plate brakes for crane applications.

1997, Softbound — TR-11
 Member Price US\$25
 Non-Member Price US\$40



Design and Maintenance of Basic Oxygen Furnaces♦

The report provides a set of criteria for the material selection, design, fabrication, erection, inspection, testing, maintenance and alteration of certain BOF components. It also serves as a general specification to provide uniformity among various vendors during the bidding stage and to provide guidelines for the contract award.

1996, Softbound — TR-32
 Member Price US\$45
 Non-Member Price US\$70



Repair of Steel Pressure-Containing Components for Blast Furnace Installations♦

This technical report is intended to present guidelines for the repair of steel pressure-containing components that operate above 15 psig in blast furnace installations. Repair design criteria, as well as examples of repair designs that have been successfully applied in practice, are included. This edition clarifies the differences between and requirements of temporary and permanent repairs.

1994, Softbound — TR-27R
 Member Price US\$45
 Non-Member Price US\$70



Insulated Conductors for Crane and Mill Auxiliary Motors♦

This technical report provides the minimum recommended conductor size for mill motors when applied to cranes and mill auxiliary drives. It presents guidelines for the selection of conductor insulation, jacketing, construction and stranding. Also included are guidelines for the selection and installation of conduit and raceways, as well as guidelines to aid in the specification and installation of moving support systems.

1992, Softbound — TR-08
 Member Price US\$25
 Non-Member Price US\$40



DC Mill Motors♦

This technical report covers series, shunt and compound wound motors of two standard enclosure types: TENV (totally enclosed non-ventilated) and TEFV (totally enclosed forced ventilation from a separate source).

1991, Softbound — TR-01
 Member Price US\$5
 Non-Member Price US\$10



Specifications for Ladle Hooks♦

This technical report covers new laminated ladle hooks, which are rectangular in cross-section and are used primarily for lifting hot metal ladles. Hooks rigidly attached to a spreader beam are not discussed in this report.

1991, Softbound — TR-07
 Member Price US\$20
 Non-Member Price US\$30



New Steel Pressure-Containing Components for Blast Furnace Installations♦

AISE Subcommittee No. 27 on New Steel Pressure-Containing Components for Blast Furnace Installations was formed in 1974 to establish criteria for the design, fabrication and construction of new steel pressure-containing components for blast furnace installations. This report has been prepared by a committee consisting of designers, owners and manufacturers who considered the current technology available. The intention is to present a set of criteria for the design, material selection, fabrication, erection, inspection and testing of new steel pressure-containing components used in blast furnace installations.

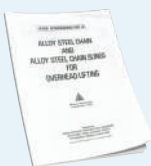
1984, Softbound — TR-27
 Member Price US\$45
 Non-Member Price US\$70



DC Crane Control Print Reading

Originally prepared as a classroom training course conducted in a number of U. S. Steel plants, this manual grew out of a long-felt need in the area of maintenance of overhead cranes powered by DC motors. The self-directed training course takes the trainee from troubleshooting through print reading. Two large prints are provided, as well as an answer key for effective study of the principles involved.

1981, Softbound — PB-339
 Member Price US\$25
 Non-Member Price US\$50



Alloy Steel Chain and Alloy Steel Chain Slings for Overhead Lifting♦

This standard is intended to serve alloy steel chain users as a guide to loading, wear and other usage limitations in normal industrial lifting chain service.

1974, Softbound — TR-04
 Member Price US\$10
 Non-Member Price US\$15



Guidelines for the Inspection, Maintenance and Repair of Hot Metal Cars

Hot metal cars (a.k.a. torpedo cars, sub cars, bottle cars, Pugh cars, mixer cars) are used to transport molten iron from the blast furnace to the steelmaking facility. They are vital to the everyday operation of integrated steel manufacturers. The purpose of this document is to provide guidelines for inspection, maintenance and repairs of hot metal cars.

2012, PDF — TR-33
 Member Price US\$25
 Non-Member Price US\$45



AVAILABLE MAY 2015
AISTech 2015 Conference Proceedings
(3-Vol. Book Set + Flash Drive)

The *AISTech 2015 Conference Proceedings* contain papers from the technical sessions at steel's premier event of 2015. These papers offer a wide range of technological advances in the iron and steel industry, including everything from coke production to continuous casting to sensors and automation.

ISBN: 978-1-935117-47-6
 2015, 3-Vol. Book Set — PB-369
 Member Price US\$220
 Non-Member Price US\$320

ISBN: 978-1-935117-46-9
 2015, Flash Drive — PB-368
 Member Price US\$125
 Non-Member Price US\$160

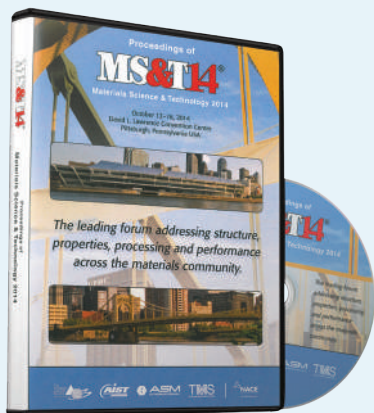
2015, 3-Vol. Book Set w/Flash Drive — PB-368EPKG
 Member Price US\$300
 Non-Member Price US\$415

Other AISTech Proceedings

Pick up one of these proceedings from a previous conference you may have missed!

	Softbound Book Set		CD-ROM		Book Set With CD-ROM	
AISTech 2014 <i>Indianapolis, Ind.</i>	PB-367	M-US\$220 NM-US\$300	PB-366	M-US\$125 NM-US\$160	PB-366EPKG	M-US\$300 NM-US\$415
AISTech 2013 <i>Pittsburgh, Pa.</i>	PB-365	M-US\$185 NM-US\$265	PB-364	M-US\$125 NM-US\$160	PB-364EPKG	M-US\$285 NM-US\$400
AISTech 2012 <i>Atlanta, Ga.</i>	PB-363	M-US\$185 NM-US\$265	PB-362	M-US\$125 NM-US\$160	PB-363EPKG	M-US\$285 NM-US\$400
AISTech 2011 <i>Indianapolis, Ind.</i>	PB-361	M-US\$175 NM-US\$245	PB-360	M-US\$125 NM-US\$160	PB-361EPKG	M-US\$275 NM-US\$380
AISTech 2010 <i>Pittsburgh, Pa.</i>	PB-359	M-US\$175 NM-US\$245	PB-358	M-US\$125 NM-US\$160	PB-359EPKG	M-US\$275 NM-US\$380
AISTech 2009 <i>St. Louis, Mo.</i>	—	—	PB-356	M-US\$125 NM-US\$160	—	—
AISTech 2008 <i>Pittsburgh, Pa.</i>	PB-354	M-US\$155 NM-US\$198	PB-353	M-US\$125 NM-US\$160	PB-354EPKG	M-US\$272 NM-US\$350
AISTech 2007 <i>Indianapolis, Ind.</i>	—	—	PB-351	M-US\$125 NM-US\$160	—	—
AISTech 2006 <i>Cleveland, Ohio</i>	PB-350	M-US\$155 NM-US\$198	PB-349	M-US\$125 NM-US\$160	PB-350EPKG	M-US\$272 NM-US\$350
AISTech 2005 <i>Charlotte, N.C.</i>	PB-347	M-US\$145 NM-US\$185	PB-346	M-US\$100 NM-US\$150	PB-347EPKG	M-US\$240 NM-US\$330
AISTech 2004 <i>Nashville, Tenn.</i>	—	—	PB-342	M-US\$100 NM-US\$150	—	—

M = Member • NM = Non-Member



2014 MS&T Conference Proceedings

The complete proceedings from the 2014 Materials Science & Technology Conference available on one searchable CD-ROM. Included are manuscripts from symposia in diverse themes: iron and steel, biomaterials, ceramic and glass materials, electronic and magnetic materials, energy issues, fundamentals and characterization, green manufacturing and sustainability, materials-environment interactions, nanomaterials, processing and product manufacturing, and surface modification.

ISBN: 978-0-87339-763-6
 2013, CD-ROM — PB-277
 Member Price US\$146
 Non-Member Price US\$195



2013 MS&T Conference Proceedings

The CD-ROM contains a full-text PDF of all the manuscripts from the MS&T'13 conference submitted for publication, searchable by symposium title or author name. Included are manuscripts from 44 symposia in 11 diverse themes: iron and steel, biomaterial technology, ceramic and glass materials, corrosion control and sustainability, electronic and magnetic materials, environmental and energy issues, fundamentals and characterization, materials performance, nanotechnology, processing and product manufacturing, and special topics.

ISBN: 978-0-87339-762-9
 2013, CD-ROM — PB-276
 Member Price US\$146
 Non-Member Price US\$195

Other MS&T Proceedings

Steel Properties & Applications Proceedings

	MS&T CD-ROM	
2012 <i>Pittsburgh, Pa.</i>	PB-275	M-US\$146 NM-US\$195
2011 <i>Pittsburgh, Pa.</i>	PB-274	M-US\$146 NM-US\$195
2010 <i>Houston, Texas</i>	PB-273	M-US\$146 NM-US\$195
2009 <i>Pittsburgh, Pa.</i>	PB-272	M-US\$146 NM-US\$195
2008 <i>Pittsburgh, Pa.</i>	PB-271	M-US\$146 NM-US\$195
2007 <i>Detroit, Mich.</i>	PB-270	M-US\$146 NM-US\$195

	SP&A Softbound Book	
2012 <i>Pittsburgh, Pa.</i>	PB-265	M-US\$175 NM-US\$245
2011 <i>Pittsburgh, Pa.</i>	PB-264	M-US\$175 NM-US\$245
2010 <i>Houston, Texas</i>	PB-263	M-US\$175 NM-US\$245
2009 <i>Pittsburgh, Pa.</i>	PB-262	M-US\$175 NM-US\$245
2008 <i>Pittsburgh, Pa.</i>	PB-261	M-US\$150 NM-US\$210
2007 <i>Detroit, Mich.</i>	PB-260	M-US\$150 NM-US\$210

M = Member • NM = Non-Member



2013 International Symposium on New Developments in Advanced High-Strength Sheet Steels*

The proceedings from the 2013 International Symposium on New Developments in Advanced High-Strength Sheet Steels in Vail, Colo., USA, on 23–27 June 2013 contain papers highlighting the state-of-the-art research and development pertaining to advanced high-strength steel (AHSS). The topics include the latest developments in dual-phase, twinning-induced plasticity, martensitic, quenched and partitioned steels, other third-generation AHSS concepts and hot stamped steels, along with recent experiences with industrial implementation and end-user application performance. A CD-ROM containing all the papers in the book is included.

ISBN: 978-1-935117-34-6
 2013, Softbound w/CD-ROM— PB-294
 Member Price US\$125
 Non-Member Price US\$160



2011 International Symposium on the Recent Developments in Plate Steels

The 2011 International Symposium on the Recent Developments in Plate Steels Proceedings include technical papers presented at the Winter Park Mountain Lodge, Winter Park, Colo., USA, on 19–22 June 2011. The symposium was designed to gather state-of-the-art ideas and developments from the international community and to serve as a forum for technical exchange among steel professionals representing various segments, including R&D, production, design and manufacturing, end users, academia and government. CD-ROM included.

ISBN: 978-1-935117-20-9
 2011, Softbound w/CD-ROM — PB-258
 Member Price US\$125
 Non-Member Price US\$160



2008 International Conference on New Developments in Advanced High-Strength Sheet Steels

Held in cooperation with the Colorado School of Mines, the 2008 International Conference on New Developments in Advanced High-Strength Sheet Steels Proceedings focus on the latest developments in hot rolled, cold rolled, and coated low-alloy transformation-induced plasticity (TRIP) steels and dual-phase steels. The papers address new developments in areas including alloy and process design, fundamental physical and mechanical metallurgy of these grades, industrial processing and applications behavior such as forming, welding and performance. CD-ROM included.

ISBN: 978-1-886362-99-4
 2008, Softbound w/CD-ROM — PB-256
 Member Price US\$125
 Non-Member Price US\$160



2007 International Conference on Microalloyed Steels*

This symposium covers recent applications of microalloying technology to a broad range of products, including plate, pipes, strip, sheet, bar and forgings.

ISBN: 978-1-886362-93-2
 2007, Softbound w/CD-ROM — PB-293
 Member Price US\$135
 Non-Member Price US\$195



49th International Colloquium on Refractories

The preface and one paper are in German, while the rest of the content is in English. Topics include: Unshaped Refractories, New Refractories, Glass I & II, Ceramics, Incineration/Chemistry, Cement and Testing/Properties. Includes CD-ROM.

ISBN: 978-3-514007-30-7
 2006, Softbound w/CD-ROM — PB-VDEH-017
 Member Price US\$81.20
 Non-Member Price US\$105



2006 International Conference on New Developments in Long and Forged Products: Metallurgy and Applications[†]

Topics include: microalloying-related advancements for automotive bar and forgings, heavy section structural beams, steels with improved machinability and other performance attributes, fundamental metallurgical and microstructural developments and process concepts.

ISBN: 978-1-886362-87-1

2006, Softbound — PB-292

Member Price US\$125

Non-Member Price US\$160



EOSC 2006 Proceedings, 5th European Oxygen Steelmaking Conference

The proceedings include technical papers from the June 2006 conference organized by Steel Institute VDEh in Aachen, Germany.

ISBN: 978-3-514007-27-7

2006, Softbound w/CD-ROM —

PB-VDEH-018

Member Price US\$137.20

Non-Member Price US\$160



ICS 2005 Conference Proceedings[†]

The proceedings of this congress, held in conjunction with AISTech 2005, are available for purchase as a stand-alone book. Sessions include: thermodynamics, thermophysical properties,

environmental, refractories, quality, primary and secondary steelmaking, process modeling, electric arc furnace, solid steel processing, tundish modeling, mold fluxes and more.

ISBN: 978-1-886362-81-9

2005, Softbound — PB-348

Member Price US\$120

Non-Member Price US\$155



2004 International Conference on Advanced High-Strength Sheet Steel for Automotive Applications[†]

This international conference, held in 2004, was sponsored by AIST and the Advanced Steel Processing and Products Research Center at the Colorado School of Mines. The focus of these papers is on current developments in low-alloy transformation-induced plasticity (TRIP) steels and dual-phase steels. Also covered: new developments in areas including alloy and process design; fundamental physical metallurgy of these grades; industrial processing, including coating responses; and recent experiences with commercial production and application behavior, such as forming, welding, design and structural performance.

ISBN: 978-1-886362-72-7

2004, Softbound — PB-254

Member Price US\$65

Non-Member Price US\$85

2004, CD-ROM — PB-255

Member Price US\$65

Non-Member Price US\$85



Galvatech '04 Conference Proceedings[†]

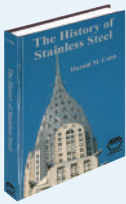
Proceedings from the international conference held in 2004 in a comprehensive volume with more than 100 papers written by industry and academic professionals. Sessions include: automotive applications, construction and appliances, process technology, fundamental research and future directions, product development, environment and corrosion, and more.

ISBN: 978-1-886362-71-8

2004, CD-ROM — PB-309

Member Price US\$100

Non-Member Price US\$125



The History of Stainless Steel

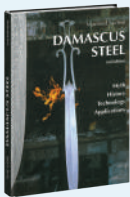
Harold M. Cobb

Stainless steel, called “the miracle metal” and “the crowning achievement of metallurgy” by the prominent metallurgist Carl Zapffe,

is a remarkable material with a fascinating history of people, places and technology. From the early discoveries to modern-day developments, *The History of Stainless Steel* tells an intriguing story of inventiveness and metallurgical progress. It tells of the discoverers in three countries, their lives, and some of the many obstacles that were encountered. This book provides a fascinating glimpse into the crowning achievements of a material that we may take for granted today. Stories cover everything from the making of consumer goods and iconic structures such as the Chrysler building and the Gateway Arch in St. Louis.

ISBN: 978-1-61503-011-8
 2010, Casebound — PB-ASM-020
 Member Price US\$59
 Non-Member Price US\$75

ISBN: 978-1-61503-010-1
 2010, Softbound — PB-ASM-019
 Member Price US\$29
 Non-Member Price US\$39



Damascus Steel: Myth, History, Technology, Applications, 3rd Edition

Manfred Sachse

Damascus steel (or “damask”) is associated with artistically

forged Turkish sabers of the 18th century. While it has become an accepted generic term, the name still conjures up a feeling of mystery. *Damascus Steel* attempts to retell the complicated and multifaceted history of the forging technology that created the flame-like motifs with gold and silver figures inlaid. Author Manfred Sachse’s years of forging activity and deep knowledge of Damascus steel are evidenced through diagrams and photographs that illustrate the beauty of the finished products, while illuminating the complex process.

ISBN: 978-3-514-00751-2
 2008, Casebound — PB-VDEH-027
 Member Price US\$105
 Non-Member Price US\$147



History of Ironmaking

J.A. Ricketts

This book provides a detailed description of the evolution of ironmaking, from ancient smelting holes to modern blast furnaces. It helps lay the foundation for understanding where the historical ironmaking journey begins and ends, while providing details of the many intermediate steps along the way.

ISBN: 987-1-886362-48-3
 1999, Casebound — PB-088
 Member Price US\$65
 Non-Member Price US\$90



Steel Conquers the World

Dr. Rainer Köthe

Steel Conquers the World recounts the fascinating history and wide-ranging uses of iron and steel. Renowned scientific journalist Dr. Rainer

Köthe offers a gripping yet easily understood portrait of iron, its provenance in cosmic fire storms and its abundance in nature. Chapters describe how iron ore is extracted from huge mines today, how gigantic blast furnaces smelt that ore and how the resultant hot metal is converted into steel. The fully illustrated book presents a number of truly spectacular applications to which iron and steel have been put. This is a great book to introduce our most important material to a younger generation.

ISBN: 978-3-514-007857
 2012, Casebound — PB-VDEH-031
 Member Price US\$18.95
 Non-Member Price US\$27



Shape, Profile and Crossbow: Hot Strip Mill Operations, Vol. IX

David T. Blazevic

The ninth volume of the *Hot Strip Mill Operations* series defines strip shape and profile, distinguishes between roll stack bending and the effects of the thermal crowns and roll wear on the shape and profiles, and explains how each aspect affects the other. Achieving these objectives will allow hot mill operators to concentrate their efforts on the critical aspects of the rolling practices to eliminate many types of shape and profile problems, to reduce the shape and profile problems for their customers, and to enhance the consistency of the shape and profile quality produced on hot strip and plate mills.

ISBN: 978-1-935117-39-1
 2015, Casebound — PB-HRC-009
 Member Price US\$200
 Non-Member Price US\$300



Passline, Strippers and Sideguides, Hot Strip Mill Operations, Vol. X

David T. Blazevic

The final installment of the *Hot Strip Mill Operations* was written to address the lack of information and knowledge about the passline's function in a rolling mill. Specifically, the book concentrates on defining the mill's passline and its function; analyzes and shows how the top and bottom strippers and plates should be designed and controlled; attempts to change in thinking from side guides to a strip guiding system for the slabs and strips; and comments on loopers and table rolls.

ISBN: 978-1-935117-43-8
 2015, Casebound — PB-HRC-010
 Member Price US\$250
 Non-Member Price US\$350



Steels: Processing, Structure, and Performance, 2nd Edition

George Krauss

This is the essential information resource for anyone who makes, uses, studies, or designs with steel. The expanded and updated second edition emphasizes processing, alloying, microstructure, deformation, fracture and properties of major steel types ranging from low-carbon sheet steels, pearlitic rail and wire steels, to quench and tempered medium- and high-carbon martensitic steels. Microstructural aspects of steelmaking, hardenability, tempering, surface hardening, and embrittlement phenomena have been updated.

ISBN: 978-1-62708-083-5
 2015, Casebound — PB-ASM-028
 Member Price US\$149
 Non-Member Price US\$199



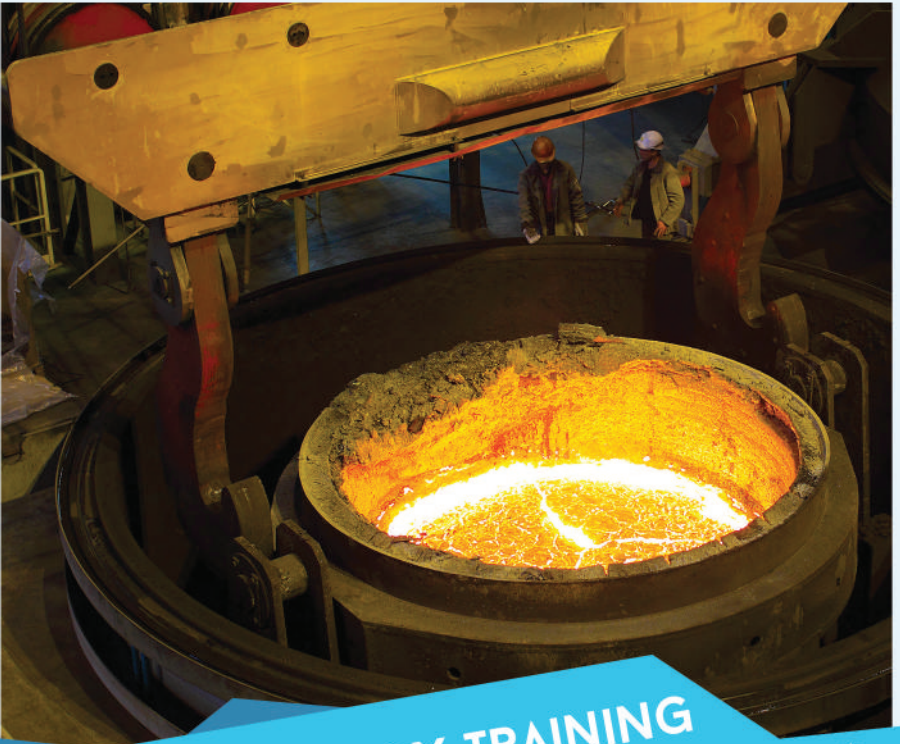
Vanadium Microalloyed Steels: A Symposium in Memory of Michael Korchynsky

The potential for applications of microalloyed steels is constantly increasing, yet processing, alloy design, and manufacturing challenges remain. The attractive balance of properties offered by vanadium microalloyed steels is derived from an advanced understanding of the optimization of microstructure through the controlled interaction between alloying and processing. The scope of this international symposium covers microalloyed sheet, plate, tubular and long products. Topics include microalloying; microstructural issues such as precipitation behavior and phase transformations; modeling behavior during cooling and rolling deformation; weldability and fabrication issues; and various end-use applications. This symposium was dedicated to Michael Korchynsky, considered a pioneer among metallurgists in the process of strengthening steel with the chemical vanadium. Korchynsky had strong ties to the field of microalloyed steels, especially in Pittsburgh, where he lived and worked. He was a strong supporter of Research at the University of Pittsburgh and funded BAMPRI's research on microalloying in steel.

ISBN: 978-1-935117-45-2
 2015, Downloadable PDF — PR-BK-500
 Member Price US\$125
 Non-Member Price US\$160

2015 Conference Proceedings

- Galvatech 2015 Conference Proceedings
- CHS² 2015 Conference Proceedings
- International Conference on Advances in Metallurgy of Long and Forged Products Proceedings



**2015 TECHNOLOGY TRAINING
CONFERENCES**



**ENHANCE YOUR EXPERTISE IN
IRON- AND STEEL-RELATED TOPICS BY
ATTENDING A TECHNOLOGY TRAINING
CONFERENCE!**

**TO SEE THE UPCOMING TRAINING
CONFERENCES, VISIT
AIST.ORG/TECHNOLOGYTRAINING**



Iron and Steel Research at Your Fingertips!



The AIST Digital Library gets the answers you need —
anytime, anywhere.

Free for AIST members!

Visit Digital.Library.AIST.org to get lightning-fast search results to the latest information from more than 10,000 technical papers and articles, including proceedings, journal articles, industry statistics and the online version of *Iron & Steel Technology*.

Not a member?

Sign up today at AIST.org.

Log In, Search, Download —
it's that easy!



Subscription packages are available for universities, institutions and corporations. Visit the AIST Digital Library for information or contact Kurt Edwards, +1.724.814.3038, kedwards@aist.org.



Association for Iron & Steel Technology
186 Thorn Hill Road
Warrendale, PA 15086-7528 USA
+1.724.814.3000 • Fax +1.724.814.3001 • AIST.org

Find all of your iron and steel publication needs at
AIST's online bookstore!

HOW TO ORDER

■ ■ Bookstore.AIST.org

■ ■ +1.724.814.3000, ext. 1

■ ■ memberservices@AIST.org

♦ Downloadable electronic versions of single papers — and, in some instances, single chapters — of these titles are available at Bookstore.AIST.org.

NON-PROFIT
U.S. POSTAGE
PAID
PITTSBURGH, PA
Permit No. 498