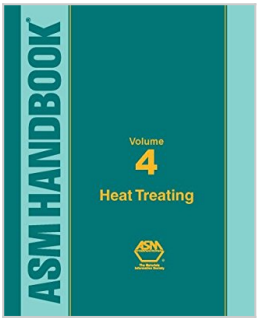

ASM Handbook: volume 4: Heat Treating (Asm Handbook) (Asm Handbook)

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The world s best and most comprehensive reference guide to all aspects of heat treating. Contents include: Heat treating of Steel quenching, tempering, and annealing, continuous annealing, quantitative methods to predict hardenability. Surface Hardening of Steel processing and properties of case hardened materials. Heat Treating Equipment emphasis on furnace design and thermal efficiency. Process and QC Considerations sensors and oxygen probes for temperature/atmosphere/carbon control, statistical process control. Heat Treating of Cast Irons includes data on austempered ductile iron and high-alloy irons. Heat Treating Stainless Steels and Heat Resistant Alloys includes superalloys and refractory metals and alloys. Sections on Heat Treating of Tool Steels and Nonferrous Alloys.

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Editorial Review

Review
In compiling this new volume on heat treating, the challenge was to produce a book that contained subject matter strongly oriented toward industrial practice but that did not omit discussions of the underlying metallurgical fundamentals. With previously published ASM Handbooks devoted to heat treating, the omission of material on fundamentals was justified by either space limitations and/or the availability of other ASM books that described the physical metallurgy associated with thermal treatments. For example, when the 8th Edition was published in 1964, only 306 pages were related to heat treating (this Volume was divided between heat-treating technology and surface cleaning and finishing). As such, readers were referred to the classic book Principles of Heat Treatment by M.A. Grossmann and E.C. Bain, which was also published in 1964 by ASM. A similar situation arose in 1981 when the expanded 9th Edition Heat Treating Handbook was published. In the year prior to this publication, a completely revised version of the Grossmann/Bain book was prepared by G. Krauss and subsequently published by ASM.
The 1980s proved to be a dynamic period for heat-treating technology a decade that witnessed the introduction of new alloys and processes as well as new tools for understanding the response of heat-treated materials. For example, new alloys under active development or brought to market during the 1980s that were not described in previous heat-treating Handbooks included duplex stainless steels, microalloyed (HSLA) steels, low-cobalt maraging steels, austempered ductile iron, directionally solidified and single-crystal superalloys, and aluminum-lithium alloys.
Changes in processing include improvements in continuous annealing, induction heating, and surface hardening operations using lasers or electron beams, the commercial viability of plasma-assisted case-hardening processes, and advances in thermomechanical processing.
But by far the most dramatic changes in heat-treat technology that have marked the past decade have been those involving newly developed tools for improving process characterization and process control. These include improved instrumentation for controlling furnace temperature, furnace atmosphere, and surface carbon content, the practical application of statistical process control (SPC), and the use of computer modelling for both the prediction of hardness profiles after quenching and the quantitative modelling of properties after tempering or case hardening. It is this latter category of computer modelling that necessitates the inclusion of material on the basic principles or fundamentals of heat treating. For example, there are several articles in this Volume that deal with computer-assisted prediction of steel hardening and hardenability as a function of heat treatment parameters. In this regard, the primary measures of steel hardening are the end-quench hardenability curves (Jominy curves), isothermal transformation (IT) curves, and continuous cooling transformation (CCT) curves. In order to understand how computer programs can be used to calculate such diagrams, some brief background information is provided in several key articles to emphasize how these diagrams make possible the selection of steel and the design of proper heat treatments.
Principal Sections

Volume 4 has been organized into eight major sections:
Heat Treating of Steel
Surface Hardening of Steel
Heat-Treating Equipment
Process and Quality Control Considerations
Heat Treating of Cast Irons
Heat Treating of Tool Steels
Heat Treating of Stainless Steels and Heat-Resistant Alloys

Heat Treating of Nonferrous Alloys --ASM International

From the Publisher
Published: 1991

About the Author
Heat-treating technology has long been an area of deep interest and concern to ASM members. In fact, the origin of the Society can be traced back to 1913 when the Steel Treaters Club was launched in Detroit. This group joined with the American Steel Treaters Society to form the American Society for Steel Treating in 1920. It was the latter organization that issued the first bound Handbook in 1928, a volume that would serve as the prototype for future generations of the ASM Handbook.
During the ensuing six decades, many changes have taken place both in terms of the positioning of the Society and the technology base it serves. In 1933 a name change to the American Society for Metals completed the transition from an organization concerned primarily with heat treating to one that served the interests of the entire metals industry. Finally in 1987, the technical scope of the Society was further broadened to include the processing, properties, and applications of all engineering/structural materials, and thus ASM International was born.
Despite these momentous changes, one fact has remained unchanged ASM's recognition of heat treating as one of the foundations of the metals sciences and its unflagging commitment to this ever-changing technology. The publication of Volume 4 of the ASM Handbook is the most recent and significant example of the sustained leadership of the Society in addressing the needs of the heat treat community.
The present volume reflects the continuing research and effort that have led to a deeper understanding of the response of ferrous and nonferrous alloys to thermal treatments. For in the 10 years since publication of its 9th Edition predecessor, significant developments have taken place in quenching and hardenability studies, computer modelling of heat-treating operations, plasma-assisted case hardening methods, and improved quality control through advanced instrumentation and/or the application of statistical process control. These are but a few of the important topics that will undoubtedly contribute toward making the Heat Treating Handbook a timeless contribution to the literature.

Users Review

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