Heat Treating Guide


Heat Treater's Guide

American Machinist, Metalworking Manufacturing

Bearing Steels This edition is a complete revision and contains a great deal of new subject matter including information on ferrous powder metallurgy, cast irons, ultra high strength steels, furnace atmospheres, quenching processes, SPC and computer technology. Data on over 135 additional irons and steels have been added to the previously-covered 280 alloys.

Iron Age An Authoritative Source: The Handbook of Quenchants and Quenching Technology is just what you need to learn both the theory and application of quenching. This book provides much-needed information on the selection and use of numerous types of quenching. For example, oil, water, salt, aqueous polymers, brine, fluidized bed, and high-pressure gas quenching are all discussed in detail. Less commonly used quenchants such as quenching into a magnetic medium, ultrasonic quenching, aus-bay quenching, HIP quenching, etc., are also discussed. Contents include: Introduction to Heat Treating of Steel Measuring Hardenability and Quench Severity Cooling Curve Analysis Quenching Oils Polymer Quenchants Quench Bath Maintenance Spray Quenching Other Quenching Media Quenching Media Quench Bath Design Impeller Agitation Quench Distortion

Failure Analysis of Heat Treated Steel Components What is heat treatment? This book describes heat treating technology in clear, concise, and nontheoretical language. It is an excellent introduction and guide for design and manufacturing engineers, technicians, students, and others who need to understand why heat treatment is specified and how different processes are used to obtain desired properties. The new Second Edition has been extensively updated and revised by Jon. L. Dossett, who has more than forty years of experience in heat treating operations and management. The update adds important information about new processes and process control techniques that have been developed or refined in recent years. Helpfull appendices have been added on decarburization of steels, boost/diffuses cycles for carburizing, and process verification.

Heat Treatment of Gears Do you want to make your Harley-Davidson run faster? Author Donny Petersen, with more than forty years of experience working on and designing Harleys, shows you how to make anything from mild to wild enhancements to your bike. He progresses from inexpensive power increases to every level of increased torque and horsepower. With graphics, pictures, and charts, Donnys Unauthorized Technical Guide to Harley-Davidson, 1936 to Present offers the real deal in performing your Harley-Davidson Evolution and guides you on a sure-footed journey to a thorough H-D Evolution performance understanding. This volume examines the theory, design, and practical aspects of Evolution performance; provides insight into technical issues; and explains what works and what doesn't in performing the Evolution. He walks you through detailed procedures such as headwork, turbo-supercharging, nitrous, big-inch Harleys, and completing simple hop-up procedures like air breathers, exhausts, and ignition modifications. In easy-to-understand terms, Donnys Unauthorized Technical Guide to Harley-Davidson, 1936 to Present shares performance secrets and provides clear guidance into what works, what does not, and whats just okay with performing the Harley Evolution power train.

"Engineers"

Carbon and Alloy Steels

Handbook of Heat Treatment of Steels The material is contained in more than 500 datasheet articles, each devoted exclusively to one particular alloy, a proven format first used in the complementary guide for irons and steels. For even more convenience, the datasheets are arranged by alloy groups: nickel, aluminum, copper, magnesium, titanium, zinc and superalloys. The book provides very worthwhile and practical information in such areas as: compositions, trade names, common names, specifications (both U.S. and foreign), available products forms, typical applications, and properties (mechanical, fabricating, and selected others). This comprehensive resource also covers the more uncommon alloys by groups in the same datasheet format. Included are: refractory metals and alloys (molybdenum, tungsten, niobium, tantalum), beryllium copper alloys, cast and P/M titanium parts, P/M aluminum parts, lead and lead alloys, tin-rich alloys, and sintering copper-base materials (copper-tin, bronze, brass, nickel silvers).

Heat Treatment, Selection, and Application of Tool Steels

Heat Treating Progress Steel and its Heat Treatment: Bofors Handbook describes the fundamental metallographic concepts, materials testing, hardenability, heat treatment, and dimensional changes that occur during the hardening and tempering stages of steel. The book explains the boundaries separating the grain contents of steel, which are the low-angle grain boundaries, the high-angle grain boundaries, and the twinning boundaries. Engineers can determine the hardenability of steel through the Grossman test or the Jominy End-Quench test. Special hardening and tempering methods are employed for steel that are going to be fabricated into tools. The different methods of hardening are manual hardening for a small surface (the tip of a screw); spin hardening for objects with a rotational symmetry (gears with 5 modules or less); and progressive hardening (or a combination with spin hardening) for flat surfaces. The hardening and tempering processes cause changes in size and shape of the substance. The text presents examples of dimensional changes during the hardening and tempering of tool steels such as those occurring in plain-carbon steels and low-alloy steels. The book is a source of reliable information needed by engineers, tool and small equipment designers, as well as by metallurgists, structural, and mechanical engineers.
Metals Reference Book

Gear Materials, Properties, and Manufacture If you are involved with machining or metalworking or you specify materials for industrial components, this book is an absolute must. It gives you detailed and comprehensive information about the selection, processing, and properties of materials for machining and metalworking applications. They include wrought and powder metallurgy tool steels, cobalt base alloys, cemented carbides, cerments, ceramics, and ultra-hard materials. You'll find specific guidelines for optimizing machining productivity through the proper selection of cutting tool materials plus expanded coverage on the use of coatings to extend cutting tool and die life. There is also valuable information on alternative heat treatments for improving the toughness of tool and die steels. All new material on the correlation of heat treatment microstructures and properties of tool steels is supplemented with dozens of photomicrographs. Information on special tooling considerations for demanding applications such as isothermal forging, die casting of metal matrix composites, and molding of corrosive plastics is also included. And you'll learn about alternatives to ferrous materials for metalworking applications such as carbides, cerments, ceramics, and nonferrous metals like aluminum, nickel, and copper base alloys.

Protective Atmospheres All of the critical technical aspects of gear materials technology are addressed in this new reference work. Gear Materials, Properties, and Manufacture is intended for gear metallurgists and materials specialists, manufacturing engineers, lubrication technologists, and analysts concerned with gear failures who seek a better understanding of gear performance and gear life. This volume complements other gear texts that emphasize the design, geometry, and theory of gears. The coverage begins with an overview of the various types of gears used, important gear terminology, applied stresses and strength requirements associated with gears, and lubrication and wear. This is followed by in-depth treatment of metallic (ferrous and nonferrous alloys) and plastic gear materials. Emphasis is on the properties of carburized steels, the material of choice for high-performance power transmission gearing.

Practical Heat Treating A comprehensive exposition of the structure of steels and the effects of different heat treatments, particularly in respect of tools. It includes solid fuel, gas and electric furnaces, case hardening, tempering and other practical information. Features accurate colour temperature charts.

Heat Treater's Guide An Emerging Tool for Pioneering Engineers Co-published by the International Federation of Heat Treatment and Surface Engineering. Thermal processing is a highly precise science that does not easily lend itself to improvements through modeling, as the computations required to attain an accurate prediction of the microstructure and properties of work hardening, tempering and heat treatment.

Steel Heat Treatment A comprehensive introduction to the tools, techniques and applications of convex optimization.

Methods of the Heat Treatment of Plain Carbon and Low Alloy Steels

Mechanical Fatigue of Metals The second edition of this modern classic encompasses the latest research, which sees bainitic alloys at the forefront of a new wave of "designed" steels. Contents include: Nondestructive Testing; Forming ofpress Components; Stress Corrosion Testing; Microstructure of Steels; Fatigue Testing; Mechanical Design of Machine Elements; Methods of Fatigue Testing; Stress-Life Relationships; Stresses and Strain Effects; Reverse Transformation from Bainite to Austenite; Acicular Ferrite; Other Morphologies of Bainite; Mechanical Properties; Modern Bainitic Alloys; Other Aspects; The Transformation of Steel.

Bainite in Steels

Convex Optimization

Hardening, Tempering and Heat Treatment

Induction Heat Treatment of Steel Following a general introduction, which reviews steelmaking practices as well as the classification, general properties, and applications of steel, this volume contains four major sections that describe processing characteristics, service characteristics, corrosion behavior, and material requirement

Regional Industrial Buying Guide

Steel and Its Heat Treatment

Atlas of Isothermal Transformation and Cooling Transformation Diagrams This volume contains the proceedings of the XIX International Colloquium on Mechanical Fatigue of Metals, held at the Faculty of Engineering of the University of Porto, Portugal, 5-7 September 2018. This International Colloquium facilitated and encouraged the exchange of knowledge and experiences among the different communities involved in both basic and applied research in the field of the fatigue of metals, looking at the problem of fatigue exploring analytical and numerical simulative approaches. Fatigue damage represents one of the most important types of damage to which structural materials are subjected in normal industrial services that can finally result in a sudden and unexpected abrupt fracture. Since metal alloys are still today the most used materials in designing the majority of components and structures able to carry the highest service loads, the study of the different aspects of metals fatigue attracts permanent attention of scientists, engineers and designers.

ASM Specialty Handbook This reference book makes it easy for anyone involved in materials selection, or in the design and manufacture of metallic structural components to quickly screen materials for a particular application. Information on practically all ferrous and nonferrous metals including powder metals is presented in tabular form for easy review and comparison between different materials. Included are chemical compositions, physical and mechanical properties, manufacturing processes, applications, pertinent specifications and standards, and test methods. Contents Overview: Glossary of metallurgical terms Selection of structural materials (specifications and standards, life cycle and failure modes, materials properties and design, and properties and applications) Physical data on the elements and alloys Testing and inspection Chemical composition and processing characteristics

Extrusion A unique feature is the large number of data sheets provided giving the chemical composition, physical and mechanical properties and the general characteristics of steels and their corresponding international standard grades. Also, given are the heat treatment procedures and sequence of manufacturing operations. With its comprehensive coverage and wealth of practical data and guidelines, the book
would be indispensable to heat treaters, planning engineers, material engineers, production engineers and students of metallurgy and production engineering.

Steel Heat Treatment Handbook The second edition of Extrusion is designed to aid operators, engineers, and managers in extrusion processing in quickly answering practical day-to-day questions. The first part of the book provides the fundamental principles, for operators and engineers, of polymeric materials extrusion processing in single and twin screw extruders. The next section covers advanced topics including troubleshooting, auxiliary equipment, and coextrusion for operators, engineers, and managers. The final part provides applications case studies in key areas for engineers such as compounding, blown film, extrusion blow molding, coating, foam, and reprocessing. This practical guide to extrusion brings together both equipment and materials processing aspects. It covers basic and advanced topics, for reference and training, in thermoplastics processing in the extruder. Detailed reference data are provided on such important operating conditions as temperatures, start-up procedures, shear rates, pressure drops, and safety. A practical guide to the selection, design and optimization of extrusion processes and equipment. Designed to improve production efficiency and product quality. Focuses on practical fault analysis and troubleshooting techniques.

Handbook of Quenchants and Quenching Technology This comprehensive resource provides practical insights into steel heat treatment topics such as sources of residual stress and distortion, hardenability prediction, modeling, effects of steel alloy chemistry on heat treatment, quenching, carburizing, nitriding, vacuum heat treatment, metallography, and process equipment. Containing recent data and developments from international experts, the Steel Treatment Handbook discusses the principles of heat treatment; quenchants, quenching systems, and quenching technology; strain gauge procedures, X-ray diffraction, and other residual stress measurement methods; carburizing and carbonitriding; powder metalurgy technology; metallography and physical property determination; ecological regulations and safety standards; and more. Well illustrated with nearly 1000 tables, equations, figures, and photographs, the Steel Heat Treatment Handbook is an excellent reference for materials, manufacturing, heat treatment, maintenance, mechanical, industrial, process and quality control, design, and research engineers; department or corporate metallurgists; and upper-level undergraduate and graduate students in these disciplines.

Handbook of Thermal Process Modeling Steels

ASM Metals Reference Book, 3rd Edition


Carburizing Improper heat treatment of tool steels can lead to shorter tool life, higher incidences of metal fatigue, dangerous procedures, and expensive errors. To avoid these costly mistakes, leading expert Bill Bryson takes the mystery out of tool steel heat treatment by presenting a clear, practical approach to common techniques and applications. This easy-to-understand book is ideal for toolmakers, machinists, and engineers. It takes a comprehensive look at common heat treatment procedures used in shops around the world and provides detailed instructions for all types of tool steels.

Donny'S Unauthorized Technical Guide to Harley-Davidson, 1936 to Present Annotation Rakhts wants other engineers to avoid the considerable trouble he had understanding the art of gear heat treatment when he first embarked on a career in gear design and manufacturing. He explains how heat treating and gears made of some kinds of steel gives the gears high geometric accuracy, but can also distort them and raise the cost of manufacturing, so a gear engineer needs to excel in manufacturing, lubrication, life and failure analysis, and machine design as well as design. He presents a case history of each successful gear heat treatment process that provide information on the quality of gear that can be expected with the proper control of material and processes. Annotation copyrighted by Book News Inc., Portland, OR

Approval Guide

Heat Treatment

Oceans '88 Proceedings A great deal of progress has been made in the development of materials, their application to structures, and their adaptation to a variety of systems and integrated across a wide range of industrial applications. This encyclopedia serves the rapidly expanding demand for information on technological developments. In addition to providing information

Handbook of Comparative World Steel Standards This book focuses on heat-treating by ASM, SME, and AISI standards. The manual has been created for use in student education, as well as to guide professionals who has been heat treating their entire lives. It is written without the typical metallurgical jargon. This book will serve as a training manual from day one in learning how to heat treat a metal, and then also serve as a day to day reference for a lifetime. This manual zeros in on the popular tool steels, alloy steels, heat-treatable stainless steels, case hardening steels, and more. It deals with these metals with up-to-date usage and processing recipes. What is different with this manual from all the others is that it doesn't just deal with the heat-treatment process, it also covers the continuation of the hardening process with cryogenics. Yes, it is written to help those who may want a thorough understanding of what goes on in the process of heat-treating, and how to do it better. However, it also shows how proper heat and cryogenic processing can save your company money. Making money through longer tool life, decarb-free and stress relief, all while learning how to create a better, finer grain structure. This manual shows the reader that hardness is only an indication of hardness, and that the real money savings is in the fine grained structure. This manual is written for toolmakers, engineers, heat-treaters, procurement, management personnel, and anyone else who is involved in metals. Metals are affected by the entire thermal scale from 2400°F, down to -320°F. That is the complete range of thermally treated metals and that is what this manual covers.

Encyclopedia and Handbook of Materials, Parts and Finishes