



Steels: Processing, Structure, And Performance

By George Krauss

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Steels: Processing, Structure, and Performance is a comprehensive guide to the broad, dynamic physical metallurgy of steels. The volume is an extensively revised and updated edition of the classic 1990 book Steels: Heat Treatment and Processing Principles. Eleven new chapters expand the coverage in the previous edition, and other chapters have been reorganized and updated. This volume is an essential reference for anyone who makes, uses, studies, or designs with steel. The interrelationships between chemistry, processing, structure, and performance--the elements of physical metallurgy--are integrated for all the types of steel discussed. The evolution, characterization, and performance of steel microstructures are described, with increased emphasis on deformation and fracture. Heat treatment remains a vital aspect of the manufacture of steel products, and the coverage of thermal processing and its effect on steels is expanded in this edition. Dramatic changes in steel manufacture have occurred in the 15 years since the publication of the 1990 edition. Low-carbon sheet steels have experienced the most dynamic changes: thermal processing of sheet steels on a massive continuous scale has produced new grades with only subtle changes in chemistry. Low carbon sheet steels, together with strengthening mechanisms, developments in microalloyed forging steels, steels with bainitic and a variety of ferritic microstructures, quench and tempered steel performance, high-carbon steels for rail and ultra-high strength wire, and the causes of low toughness and embrittlement are all discussed in new chapters. Brief coverage is provided on the history of steel, including the time frame for important developments. A link to steelmaking and solidification is made in the chapter on the effects of primary processing on steel microstructure. The text is meant to be informative, readable, up-to-date, and self contained. Principles, concepts, and understanding of microstructural evolution and performance, within the framework of processing and properties, are illustrated, by plots of data, micrographs and schematic diagrams. A special effort has been made to include references to the most pertinent books, reviews, and technical papers on a given subject.



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