

Practical Heat Treating

Howard E.
Boyer



American Society for Metals

2-671-10-1

2-671-10-1

Practical Heat Treating

by
Howard E. Boyer



American Society for Metals
Metals Park, OH 44073

Contents

| | | |
|----|--|-----|
| 1 | What Is Heat Treatment? Classification and Commercial Importance | 1 |
| 2 | Fundamentals in the Heat Treatment of Steel | 17 |
| 3 | Hardness and Hardenability | 34 |
| 4 | Furnaces and Related Equipment for Heat Treating | 59 |
| 5 | Heat Treating of Carbon Steels | 91 |
| 6 | Heat Treating of Alloy Steels | 121 |
| 7 | Heat Treating of Stainless Steels | 136 |
| 8 | Heat Treating of Tool Steels | 149 |
| 9 | Heat Treating of Cast Irons | 165 |
| 10 | Case Hardening of Steel | 180 |
| 11 | Flame and Induction Hardening | 196 |
| 12 | Heat Treating of Nonferrous Alloys | 209 |
| | References | 221 |
| | Index | 223 |

About the book

Practical Heat Treating presents heat treating technology in clear, concise, and nontheoretical language. It is directed to design engineers, manufacturing engineers, shop personnel, students and others requiring an understanding of why heat treatment is specified and how the various heat treating processes are employed to obtain desired engineering properties.

About the author

Howard E. Boyer's career in metallurgy spans 50 years from the laboratory at Cooper Bessemer Corp. in Grove City, Pennsylvania, in 1934 to his current affiliation with the American Society for Metals in Metals Park, Ohio.

The author spent five years at Cooper Bessemer before becoming chief metallurgist at American Bosch Corp., Springfield, Massachusetts. During his tenure there, Mr. Boyer, a registered professional engineer in the Commonwealth of Massachusetts, served as chairman of the Springfield Chapter of ASM and was a member of the Society of Manufacturing Engineers and the Society for Non-Destructive Testing.

A member of ASM since 1940, Mr. Boyer began his professional service to the Society in 1947. At Metals Park he has been Director of Reference Publications and editor of the Metals Handbook. After his retirement in 1977 at the completion of the 8th edition of the Handbooks, he became a consulting metallurgical engineer. In his consulting capacity he remains active with the Society in writing and editing as well as teaching for the Metals Engineering Institute.

He is the editor of one book and the author of more than 30 technical papers principally concerned with heat treating and forging processes. Several of these papers have been published in England, France and Sweden. Mr. Boyer currently resides with his wife, Bernice, in Chagrin Falls, Ohio.