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# Sintering Theory And Practice



## Synopsis

Although sintering is an essential process in the manufacture of ceramics and certain metals, as well as several other industrial operations, until now, no single book has treated both the background theory and the practical application of this complex and often delicate procedure. In *Sintering Theory and Practice*, leading researcher and materials engineer Randall M. German presents a comprehensive treatment of this subject that will be of great use to manufacturers and scientists alike. This practical guide to sintering considers the fact that while the bonding process improves strength and other engineering properties of the compacted material, inappropriate methods of control may lead to cracking, distortion, and other defects. It provides a working knowledge of sintering, and shows how to avoid problems while accounting for variables such as particle size, maximum temperature, time at that temperature, and other problems that may cause changes in processing. The book describes the fundamental atomic events that govern the transformation from particles to solid, covers all forms of the sintering process, and provides a summary of many actual production cycles. Building from the ground up, it begins with definitions and progresses to measurement techniques, easing the transition, especially for students, into advanced topics such as single-phase solid-state sintering, microstructure changes, the complications of mixed particles, and pressure-assisted sintering. German draws on some six thousand references to provide a coherent and lucid treatment of the subject, making scientific principles and practical applications accessible to both students and professionals. In the process, he also points out and avoids the pitfalls found in various competing theories, concepts, and mathematical disputes within the field. A unique opportunity to discover what sintering is all about--both in theory and in practice. What is sintering? We see the end product of this thermal process all around us--in manufactured objects from metals, ceramics, polymers, and many compounds. From a vast professional literature, *Sintering Theory and Practice* emerges as the only comprehensive, systematic, and self-contained volume on the subject. Covering all aspects of sintering as a processing topic, including materials, processes, theories, and the overall state of the art, the book

- \* Offers numerous examples, illustrations, and tables that detail actual processing cycles, and that stress existing knowledge in the field
- \* Uses the specifics of various consolidation cycles to illustrate the basics
- \* Leads the reader from the fundamentals to advanced topics, without getting bogged down in various mathematical disputes over treatments and measurements
- \* Supports the discussion with critically selected references from thousands of sources
- \* Examines the sintering behavior of a wide variety of engineered materials--metals, alloys, oxide ceramics, composites, carbides, intermetallics, glasses, and polymers
- \* Guides the reader through the

sintering processes for several important industrial materials and demonstrates how to control these processes effectively and improve present techniques \* Provides a helpful reference for specific information on materials, processing problems, and concepts For practitioners and researchers in ceramics, powder metallurgy, and other areas, and for students and faculty in materials science and engineering, this book provides the know-how and understanding crucial to many industrial operations, offers many ideas for further research, and suggests future applications of this important technology. This book offers an unprecedented opportunity to explore sintering in both practical and theoretical terms, whether at the lab or in real-world applications, and to acquire a broad, yet thorough, understanding of this important technology.

## **Book Information**

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## **Customer Reviews**

A renowned pioneer in the field and the recipient of numerous awards for his research, German has written a comprehensive book which emphasizes the theory of sintering but includes information on the sintering behavior of diverse engineered materials--metals, alloys, oxide ceramics, composites, carbides, intermetallic glasses and polymers. He identifies key variables, measurements, systems, applications and calculation techniques. The text's format enables readers to seek specific information on a material, processing problem or concept without reading all sections in sequence.

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background theory and the practical application of this complex and often delicate procedure. In Sintering Theory and Practice, leading researcher and materials engineer Randall M. German presents a comprehensive treatment of this subject that will be of great use to manufacturers and scientists alike. This practical guide to sintering considers the fact that while the bonding process improves strength and other engineering properties of the compacted material, inappropriate methods of control may lead to cracking, distortion, and other defects. It provides a working knowledge of sintering, and shows how to avoid problems while accounting for variables such as particle size, maximum temperature, time at that temperature, and other problems that may cause changes in processing. The book describes the fundamental atomic events that govern the transformation from particles to solid, covers all forms of the sintering process, and provides a summary of many actual production cycles. Building from the ground up, it begins with definitions and progresses to measurement techniques, easing the transition, especially for students, into advanced topics such as single-phase solid-state sintering, microstructure changes, the complications of mixed particles, and pressure-assisted sintering. German draws on some six thousand references to provide a coherent and lucid treatment of the subject, making scientific principles and practical applications accessible to both students and professionals. In the process, he also points out and avoids the pitfalls found in various competing theories, concepts, and mathematical disputes within the field. This book offers an unprecedented opportunity to explore sintering in both practical and theoretical terms, whether at the lab or in real-world applications, and to acquire a broad, yet thorough, understanding of this important technology.

This is a wonderful text book for anyone involved in sintering of technical ceramics or powder metallurgy. German is incredible thorough in his research, and presents the book in a very easy to read format. Highly, highly recommended for materials scientists and metallurgists.

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